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UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration
Bureau of Plant Industry, Soils, and Agricultural
Engineering

THE NATIONAL POTATO-BREEDING PROGRAM
1952

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Division of Vegetable Crops and Diseases
and
the State Cooperators

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(Twenty-third Annual Report to Cooperators)

Plant Industry Station
Beltsville, Md.

March 1953

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NATIONAL POTATO-BREEDING PROGRAM, 1952

By F. J. Stevenson

Yields

In Maine a very wet planting season and a dry growing season resulted in relatively low yields. B 2368-4, a red scab-resistant variety, yielded at the rate of 481 bushels of U.S. No. 1's per acre, as compared with 922 bushels in 1951. In a test of early varieties Cobbler yielded at the rate of 362 bushels per acre and White Cloud, a Nebraska variety, 295. The difference was significant at the 1-percent level. Kennebec yielded 467 bushels as compared with 346 for Katahdin, a highly significant difference. On the other hand, at Greeley, Colo., Kennebec yielded 693 bushels per acre and Katahdin 708, not a significant difference.

The cooperative potato-testing program for the north central region, begun in 1951, was continued in eight States in 1952.

The variances of the different tests for both yield and specific gravity were not homogeneous, so that it was not advisable to pool the data and run combined analyses. The means could not be interpreted statistically but some general conclusions were drawn from the results. It would be surprising to find a variety adapted to the wide range of environmental conditions and cultural practices represented by the eight States that cooperated in making the tests, and while some varieties are more widely adapted than others it is quite improbable that a variety will be found adapted to all the States in the north central region, much less to all the potato-producing States.

Data from other States increase our knowledge of the effects of environment on a quantitative character, such as yield.

Market Quality

Varieties and seedlings differ in market quality when grown under similar conditions but the differences in a single variety grown under diverse conditions are very great. All very large tubers are inclined to be rough and deep-eyed. Closer planting and lighter applications of fertilizer will remedy this without cutting down too much on yield, especially in vigorous-growing varieties such as Sequoia, Pungo, and Kennebec.

Tuber shape is also affected by environment, especially by soil texture. A variety may produce tubers with desirable shape grown in a good sandy loam soil but the tubers of the same variety may be very rough and misshapen grown in a heavy clay soil.

Tuber color is another character that is influenced by environment. A variety may be dark red when grown in one place but pale red or almost white when grown under other conditions. This is true also of russetting.

B 515-2 shows very little russeting when grown on the Chapman Farm in Maine but is heavily russeted in some fields in North Dakota and Idaho.

Cooking Quality

Cooking quality is perhaps the most complex character with which the potato breeder has to work. No one knows how many characters are involved in the complex, and, besides, people's tastes differ. Some, especially those who developed their tastes in their younger days in the northern tier of States, prefer a potato high in dry matter but others prefer potatoes that are not too dry. This is fortunate, or how could the growers in the Southern States or some districts of other States sell their potatoes?

Makers of chips or frozen french fries require potatoes with a fairly high dry-matter content but there is a wide range over which they can operate. Reducing sugars or other chemical contents that affect the color of the final product are perhaps more important than dry-matter content alone.

Some varieties grown at Presque Isle, Maine, make better chips and french fries than others, as can be seen in Plant Industry tables 19 and 20. This is not due to the difference in dry-matter content. However, variety in itself is not the only answer. Maturity is important. In most cases the more mature the potato the better the color of the chips and french fries. In the date-of-planting tests the tubers of Green Mountain planted on May 6 were better for chips than those planted on the three later dates but they were all poor in quality. On the other hand, the tubers of Kennebec made good chips planted at all four dates, although the chips from the May 6 planting were superior to those from the May 26 and June 6 plantings. The chips from the four harvest dates tell the same story. The Green Mountain tubers produced very poor chips, regardless of the harvest date, and Kennebec gave very satisfactory chips even at the earliest harvest date, August 15. However, the chips from the late-harvested Kennebec were the best. The quality of the chips made from the Katahdin variety reflected the stage of maturity to a greater degree than did Kennebec or Chippewa.

Katahdin has been criticized by some people, especially from the north central region because it was low in dry-matter content. The 1952 report from the cooperative tests in eight States in that region show that at some places Katahdin was higher in dry matter than Cobbler and at some it was lower. The means for the two varieties for all places were the same. This is just another illustration of the difficulty involved in trying to indicate the dry-matter content or the cooking quality by giving the variety name.

Vitamin C Content

To some people the vitamin C content in potatoes is not important. They can buy what they need at the drug store but to others who eat more than their share of potatoes the ascorbic acid content might mean the difference between good health and sickness.

Some varieties do not hold their vitamin C in storage; others do. Studies carried on in cooperation with William C. Kelly, Cornell University, show

that this is a heritable character and that by proper breeding methods the amount of vitamin C maintained after 4 months of storage can be greatly increased. (See report by Kelly et al.).

Late Blight

The lack of rainfall during the growing season in Maine and Pennsylvania was not favorable for late blight. In Maine nonsprayed plots of susceptible varieties yielded about as much as sprayed plots. At State College, Pa., there was no blight in 1952. The discovery of new races of Phytophthora infestans is the most important factor in the blight-resistance work. Dr. W. R. Mills spent 4 months of 1952 in Mexico studying blight problems. His report is most interesting. Seedling varieties that were immune from some of the more virulent races in the United States were susceptible in Mexico.

A new race was found on Cherokee in Minnesota but a number of seedling varieties were found immune from it.

At Beltsville, Md., about 28,000 seedlings from 65 crosses and 18 selfed lines were inoculated with a mixture of zoospores from 5 isolations of P. infestans that attack Kennebec. About 20 percent of the seedlings survived. The most of these will be grown in Mexico in 1953 to get their reaction to races found there. One or both of the parents of the progenies tested were immune from one or more virulent races. Some of these parents were received from W. R. Mills, State College, Pa.; others from L. C. Peterson, Cornell Univ.; and still others were bred at Beltsville, Md. Further information on late blight is to be found in the reports from Iowa, Louisiana, Maine, Minnesota, New York, and Pennsylvania.

Scab

In 1952 seedling varieties from Maine, Wisconsin, Nebraska, North Dakota, and Michigan were sent to California, Maine, Michigan, Minnesota, North Dakota, Washington, Wisconsin, and Wyoming to be tested for their reaction to scab. The data for these tests can be found under the reports from the respective States. No scab developed in some of the tests but the two reports of greatest interest came from California and Washington State. The test in California is grown on soil so infested with organisms that a few years ago we wondered if we would ever find a variety that grown in it would be scab free. California table 2 shows that 19 named or numbered varieties in the 1952 scab nursery produced 100 percent and 7 others produced more than 90 percent marketable tubers. The White Rose check, which is supposed to be somewhat resistant to scab, produced 29 percent marketable tubers.

In another very severe test in Washington State some of the seedling varieties looked promising. This and other tests have convinced me that our method of reading the scabbiest tuber as an index of the variety is sometimes misleading. For example, Menzies reported that Cherokee was the least scabby of the named varieties -- lesions very superficial and rare but the scabbiest tuber showed type 3 pustules which would indicate that the variety is quite susceptible. In other cases there is a closer agreement. The scab epidemic in the test in Maine was not so severe as usual.

Verticillium Wilt

It was the opinion of some that resistance to verticillium wilt was associated with lateness but there is not a complete correlation, for John McLean, Aberdeen, Idaho, has produced earlies and medium earlies that show resistance. He again found a high negative correlation between wilt infection and yield. It is interesting to note that Akeley et al., working in Maine found a small but not significant negative correlation between these two characters.

In Maine in 1952 the hot dry growing season was very favorable for wilt infection. The yields of several of the varieties were relatively high for the season in spite of the heavy infection. Teton ranked first in yield, producing 547 bushels per acre in spite of 74.2 percent infection with verticillium.

When Kennebec was first released some concern was expressed because of its susceptibility to wilt. If the wilt infection reported by Akeley et al. is taken as the basis for discarding a variety, about the only named variety left would be the Ontario. If yield in spite of the wilt infection is considered several yielded as high or higher than Ontario.

There is some evidence that proper rotation will eliminate much of the wilt trouble in Maine.

Viruses A, X, and Y

Immunity from viruses A and X is fairly common in the breeding stocks. No variety has yet been released with immunity from both. One such seedling variety, B 606-67, has been tested for a number of years. In Maine it yields well and produces tubers with relatively high dry-matter content. It has one drawback. Its tubers do not hold their shape as well as some of the others. It has been mentioned as a variety that could be easily grown and produce a high yield of starch or other byproducts per acre.

Immunity from virus Y has not been found in the cultivated varieties but some seedlings show a high degree of resistance.

Leaf Roll

Several seedling varieties are highly field resistant to leaf roll but results differ as to the immunity of any of these.

Net Necrosis

The 1952 season in Maine was not conducive to the production of net necrosis. None of the varieties in the test, some of which are known to be very susceptible, showed any sign of the disease.

New Varieties

B 515-2, a selection from a cross of Russet Burbank x 96-56, is being considered for release jointly between the United States Department of Agriculture and two State experiment stations. The name tentatively chosen is Early Gem. It is an early, russet, scab-resistant variety. As grown in Idaho its dry-matter content is often not as high as that of Russet Burbank but still high enough for baking purposes. In North Dakota it is valued for its earliness and scab resistance. The quality is good. Its greatest drawback in the north central region is a tendency to develop growth cracks when growing conditions are adverse.

Knik, a new variety bred in Alaska and recently released to growers, is a medium long white-tuber variety with excellent market quality and very good cooking quality when grown at Matanuska. It is quite well adapted to growing conditions there.

Two new varieties, Dazoc and Sheridan, have been released to a number of growers in Nebraska. Both are round and bright-red (considerably darker than Triumph), eyes are relatively shallow, and tubers are generally medium in size --usually not as large as Triumph but with fewer small tubers than Progress. Tubers are not resistant to scab.

Two new varieties, Manota and Redkote, have been released in North Dakota. Manota, ND 134-19, was named by the University of Manitoba in cooperation with the North Dakota Agr. Expt. Station. It may be a substitute for Cobbler where scab and late blight are not serious problems. Redkote was named in 1952 by Ben Picha, a private potato breeder of Grand Forks, N. Dak., who bred and increased the variety. While not a major improvement over Triumph and Pontiac or Red Pontiac it seems to be superior in some respects.

PLANT INDUSTRY STATION (Beltsville, Md.) and
CHAPMAN and AROOSTOOK FARMS (Presque Isle, Maine)
F. J. Stevenson, R. V. Akeley, E. S. Schultz, and R. W. Buck

Plant Industry Station

The 1952 work at the Plant Industry Station was a continuation of that reported for 1951.

Seed Production

Conditions were again favorable for seed production and a relatively large number of cross and self pollinations were made.

New Seedlings

In 1952 about 47,000 new seedlings were grown to maturity in the greenhouses of the Plant Industry Station. These were grown to study further horticultural and disease resistance characters and if possible to get new combinations not hitherto obtained. The characters of greatest interest at present are: Tuber color, russeting, earliness, dry matter, cooking quality, vitamin C content, and resistance to viruses A, X, Y, leaf roll, net necrosis, and spindle tuber; the fungus diseases scab, late blight, early blight, and verticillium wilt; the bacterial diseases ring rot and brown rot; and the insects leaf hoppers and aphids.

Distribution

The distribution of seed, new seedlings, and named and numbered varieties is given in Plant Industry tables 1 to 4. The seed, new seedlings from the greenhouse, and small lots of seedlings to foreign countries are shipped from the Plant Industry Station, but many shipments are made directly from Presque Isle, Maine.

P. I. table 1. Distribution of potato seed to State agricultural experiment stations and to foreign countries

State or Country	Cooperator	Progenies
Iowa	C. E. Peterson	7
Louisiana	T. P. Dykstra	47
Bolivia	Flood S. Andrews	13
Brazil	Floriano Guimaraes	17
Germany	Johannes Zscheischler	10
Israel	N. Landau	4

P. I. table 2. Distribution of new seedlings from greenhouse at Beltsville, Md., in 1952.

Station	Cooperator	Progenies	Number seedlings
Louisiana	T. P. Dykstra	7	2,594
Maine	G. W. Simpson	16	5,478
"	R. V. Akeley	79	29,739
North Dakota	W. Hoyman	16	5,284
Ohio	J. P. Slesman	3	1,510
W. Virginia	K. C. Westover	6	727

P.I. table 3. Distribution of named and numbered varieties of potatoes to foreign countries.

Country	Cooperator	Named or numbered varieties
Australia	Department of Agriculture	4
Bolivia	N. W. Winters	8
Canada	N. M. Parks	2
"	D. T. MacLeod	29
"	R. C. Layton	1
Chile	Carlos M. Pizarro	35
Denmark	Borge Jacobsen	18
Germany	Dr. Schaper	11
Germany	E. Sensburg	31
India	M. Gowda	28
"	A. B. Surie	2
Japan	K. Taguchi	7
"	H. Asuyama	1
New Zealand	C. N. Driver	12
" "	R. G. Robinson	5
Puerto Rico	T. P. Rodriguez	4
South Africa	R. Davies	6
Scotland	T. McIntosh	5
Spain	P. de la Heray Saenz	11
Uruguay	C. T. Berta	5

P. I. table 4. Distribution of named and numbered varietoes to States.

State	Cooperator	Named or numbered varieties
Alabama	C. L. Isbell	12
California	Glen N. Davis (Scab nursery)	67
"	" " "	3
"	Geo. F. Carter	1
Colorado	W. C. Edmundson	11
Connecticut	Arthur Hawkins	14
Delaware	E. P. Brasher	21
Florida	A. H. Eddins	39
"	F. V. Stevenson	7
Hawaii	C. F. Poole	1
Idaho	J. G. McLean	5
Indiana	N. K. Ellis	1
Iowa	C. E. Peterson	113
Kansas	C. L. King	8
Louisiana	T. P. Dykstra (Single hills from 27 progenies)	
Louisiana	T. P. Dykstra	101
Maine	R. V. Akeley (Recent introductions)	20
"	W. C. Libby	20
"	Maine State Seed Board	4
Massachusetts	R. W. Donaldson	16
"	K. Koch	10
Maryland	W. J. Zaumeyer (P.I.S.)	5
"	W. T. Pentzer	8
Minnesota	O. C. Turnquist (Scab nursery)	55
"	M. J. Thompson	7
Michigan	E. J. Wheeler (Scab nursery)	61
"	" " "	22
Nebraska	H. O. Werner	11
N. Carolina	Frank Haynes (Single hills from 14 progenies)	
N. Carolina	Frank Haynes	78
"	L. W. Neilsen	21
N. Dakota	W. G. Hoyman (Scab nursery)	64
" "	" " (Selections from 10- hills)	37
" "	" " (Single hills from 43 progenies)	
New Hampshire	P. Blood	5
New Jersey	J. C. Campbell	24
New York	M. W. Meadows	8
" "	J. H. Ellison	7
" "	M. K. Corbett	1
" "	R. A. Scalley	2
" "	L. C. Peterson	50
" "	" " (Selections from 29 progenies)	

P. I. table 4 continued.

State	Cooperators	Named or numbered varieties
Nevada	O. R. Schulz	20
Ohio	J. P. Sleesman	22
Pennsylvania	R. E. Hartman	24
"	J. S. Cobb	10
Rhode Island	R. C. Skogley	24
South Carolina	W. M. Epps	8
South Dakota	L. T. Richardson	9
Utah	H. Zuckerman	1
Virginia	M. M. Parker	8
Washington.	J. D. Menzies	6
"	" " (Scab nursery)	58
"	C. L. Vincent	3
West Virginia	M. E. Gallegly	35
Wisconsin	G. H. Rieman	1
"	G. H. Rieman (Scab nursery)	49
"	J. W. Guthrie	1
"	R. H. Larson	14
"	R. W. Hougas	84
Wyoming	G. H. Starr (Scab nursery)	61

Chapman Farm, Maine

In 1952, 27 named and numbered varieties of potatoes were increased on the Chapman Farm (2 acres). About 2,850 seedlings (2.5 acres) were grown in 10-hill rows, and 32,580 (6 acres) single hills were increased from single tubers previously grown from true seed in 3-inch pots at the greenhouses in Beltsville, Md. in 1951. It was a very wet spring for planting and a very dry summer for growing potatoes, so the yields were not so good as in 1951. P. I. table 5 gives a summary of the selections made from the single hills grown in 1952 and their intended use in 1953.

P. I. table 5. Summary of single-hill seedlings grown on the Chapman Farm in 1952, showing the number of seedlings planted, grown, selected, and the distribution intended for the 1953 disease-resistance tests.

Planted	Grown	selected	Late blight	Scab	Ring rot	Virus X	Virus A	Virus Y	Vert. wilt	Leaf roll	Black leg	Vitamin C
No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
32,580	26,687	5,804	585	388	351	401	487	380	362	404	1,229	3,009

The germination of the single hills was only 82 percent, which was due mostly to excess moisture after planting. Over 21 percent of the hills grown were selected for the various 1953 tests. Altogether 110 family lines were increased and

selections were made from 93 of these. Over 500 of the older seedlings grown in the 10-hill rows were checked for virus X and only a few showed latent mosaic symptoms.

Because of weather conditions, maturity and fertility data were of little value so are not included in this report.

Yield Tests, Aroostook Farm

Three seedling varieties that matured earlier than Irish Cobbler and one named variety and three seedling varieties that matured at the same time were tested in comparison with Irish Cobbler in 5 replications of 20 hills each.

The data for this test are given in P. I. table 6.

B 962-3, a scab- and blight-resistant seedling, yielded slightly, but not significantly more than I. Cobbler. In percentage of dry matter it was significantly higher than I. Cobbler.

P. I. table 6. Yield and percentage of U.S. No. 1 tubers and percentage of dry matter of varieties of potato in comparison with Irish Cobbler on Aroostook Farm, Maine 1952.

Variety	Maturity	Yield per acre		Dry matter	Characters
		U.S. No. 1			
		Bu..	Pct.	Pct.	
Irish Cobbler	E	362	93	21.2	Immune from mild mosaic
White Cloud	E	295	85	21.9	Good market quality
B 922-6	E	305	95	20.7	Resistant to virulent races of blight
B 962-3	E	375	97	21.7	Scab and blight-resistant
B 991-3	E	267	95	20.7	Do
B 991-14	EE	288	93	21.9	Do
B 2368-6	EE	264	89	18.4	Red, scab-resistant
B 2909-6	EE	198	91	17.7	Scab resistant
L.S.D. 5% level		33		.05	
" 1% "		44		.07	

Yield Tests

Sixteen numbered seedling varieties and Keswick were tested in comparison with Chippewa in 5 replications of 20 hills each. The data for this test are given in P. I. table 7.

Again, as in 1951, B 2368-4, a red scab-resistant variety, ranked first in yield, although it was not significantly higher than Chippewa. Its dry-matter content was about the same.

P. I. table 7. Yield and percentage of U.S. No. 1 tubers and percentage of dry matter of varieties of potato in comparison with Chippewa on Aroostook Farm, Maine, 1952.

Variety	Maturity	Yield per acre		Dry matter	Characters
		U.S. No. 1			
		Bu.	Pct.	Pct.	
Chippewa	M	468	97	18.6	Immune from mild mosaic and net necrosis
Keswick	M	430	92	21.4	Blight-resistant
B 73-18	L	378	98	21.9	" "
B 616-58	M	411	98		
B 931-2	L	405	98		Immune from virus X and blight-and ring-rot-res.
B 2067-18	L	372	94		Resistant to scab
B 2368-4	L	481	99	18.7	" " " , red
B 2368-11	M	405	92	18.7	" " " "
B 2431-42	M	398	95		Blight-resistant
B 2892-2	E	367	94		Res. to blight & scab
B 2894-24	L	465	97	19.9	" " "
B 2900-59	L	384	96		Resistant to scab
B 2918-2	M	387	88		" " blight
B 2918-40	M	388	91		" " "
B 2923-5	M	353	94		" " " & scab
B 2962-6	L	371	92		Leaf-roll-res. in one test.
B 3003-14	M	408	97		Resistant to blight
B 3027-26	E	308	95		" " " & scab
L.S.D. 5%		53		.22	
L.S.D. 1%		70		.31	

Keswick, a Canadian blight-resistant variety, was in the same class as Chippewa for yield but was significantly higher in dry-matter content.

B 73-18, a variety that has given good results for a number of years in Delaware, did not yield as high as Chippewa but ranked first in dry matter among the six tested for specific gravity.

Nine late-maturing varieties were tested in comparison with Katahdin in 5 replications of 20 hills each. The data for this test are given in P. I. table 8.

Kennebec was outstanding in yield and was equal to Katahdin in percentage of dry matter.

Canso, a Canadian blight-resistant variety, was highest in percentage of dry matter and yielded slightly but not significantly, higher than Katahdin.

P. I. table 8. Yield and percentage of U.S. No. 1 tubers and percentage of dry matter of varieties of potatoes in comparison with Katahdin on Aroostook Farm, Maine, 1952.

Variety	Maturity	Yield per acre		Dry matter	Characters
		U.S. No. 1			
		Bu.	Pct.	Pct.	
Canoga	L	406	93	18.4	Good quality
Canso	L	362	96	20.6	Blight-resistant
Katahdin	L	346	97	19.2	Mild-mosaic & net-necrosis resistant
Kennebec	L	467	97	19.2	Blight-resistant
B 606-37	L	377	98	--	Immune from virus X and A, and blight-resistant
B 728-8	L	362	96	--	--
B 2067-1	L	235	78	19.2	Light red and scab-resistant
B 3006-15	L	251	88	--	Blight & scab-resistant
B 3006-30	L	235	96	--	" " " "
B 3008-24	L	416	98	--	" " " "
L.S.D. 5%		32		.16	
L.S.D. 1%		43		.23	

Canoga yielded significantly higher than Katahdin but was low in percentage of dry matter. B 3008-24 gave a yield of 416 bushels per acre but the tubers had a poor appearance.

Late Blight Resistance

The 1952 late blight test was carried on in May and June in the greenhouse at Aroostook Farm. A total of 1,934 seedlings were grown in 3-inch pots, transferred to an enclosed bench with an automatic humidifier, and inoculated with the common race of late blight. During the latter part of August, 5 tuber samples of 1778 of these same seedlings were harvested at the Chapman Farm from duplicate plots, and within 2 days were placed in the storage house cellar and inoculated with the common race of late blight for the tuber rot test.

P. I. table 9 gives a summary of these data. Over 62 percent, or 1,208 seedlings, were rated 0, or free from late blight in the foliage. In the tuber-rot test 1,778 seedlings were inoculated. Approximately 60 percent, or 1,064 seedlings, remained free from tuber rot.

P. I. table 9. Summary of the data obtained on the tests for resistance to late blight in the greenhouse at Presque Isle, Maine, 1952.

Material tested	No.	Foliage test ^{1/}		No.	Tuber classes ^{2/}					
		S	O		0	1	2	3	4	5
Seedling varieties	1934	726	1208	1778	1064	238	198	135	89	54

1/ The blight data for 1952 were taken in two classes: S, infected; O, not infected.

2/ Tuber classes:

0 = No rot on any tubers
 1 = One out of five with late blight rot.
 2 = Two " " " " " "
 3 = Three " " " " " "
 4 = Four " " " " " "
 5 = Five " " " " " "

By. R. W. Buck, Lillian Cash, and F. J. Stevenson

During September and October 1952, a total of 28,376 seedlings from 65 crosses and 18 selfed lines were inoculated with a mixture of zoospores from 5 isolations of Phytophthora infestans. The seedlings were inoculated at an early stage of development while they were in the seed flat. The flats were covered with glass. The humidity under the glass was kept high by frequent sprays of water from a fine nozzle. About one week or 10 days after inoculation all dead seedlings and those on which sporangiophores had developed were counted and discarded. The survivors were transplanted into pots. After being transplanted seedlings on which sporangiophores developed were recorded and discarded.

The data for this test are given in P. I. table 10. From the 28,376^{seedlings} inoculated, 22,812, or 80.4 percent, were infected; and 5,564, or 19.6 percent, were free from late blight.

One or both of the parents of the progenies tested were immune from one or more of the more virulent races. Some of these parents were received from W. R. Mills of State College, Pa.; others from L. C. Peterson, Cornell Univ.; and still others were produced at Beltsville, Md.

P. I. table 10. Summary of data obtained from late-blight inoculation test of seedlings at Beltsville, 1952.

Crosses and lines	Seedlings inoculated	Seedlings infected		Seedlings surviving	
		No.	Pct.	No.	Pct.
65 Crosses	24,525	20,112	82.0	4,413	18.0
18 Selfed lines	3,851	2,700	70.1	1,151	29.9
Total	28,376	22,812	80.4	5,564	19.6

Scab Resistance
R. V. Akeley and F. J. Stevenson

In 1952 the scab test was repeated again and 55 family lines consisting of 1,465 seedlings were compared with the susceptible Green Mountain checks on the Aroostook Farm. Single hill seedlings, alternating with the checks, were planted. The level of infection was not as high as usual due to a very dry growing season, but satisfactory comparisons and considerable resistance were observed. (P. I. table 11)

Of the 1,465 seedlings tested, 1,004 showed only a trace of their surface covered with scab, and 424 had a mean coverage of 10 percent. These two classes account for more than 94 percent of the total number or 1,428 seedlings. All but 11 of the alternate Green Mountain checks showed pustule type 3 and only 53 percent, or 776 seedlings had a mean coverage of 10 percent or less. If seedlings occurring in pustule type classes 1 and 2 are considered resistant, then approximately 1,156 seedlings or 78.9 percent are better for resistance than the checks.

P. I. table 11. Summary of the data obtained from the scab tests on the Aroostook Farm, Maine, in 1952.

Material tested	No.	Surface area covered 1/						Type of pustule 2/			
		T	1	2	3	4	5	1	2	3	4
Seedling varieties	1465	1004	424	33	4	0	0	676	480	307	2
Green Mountain check	1465	102	674	591	96	2		0	11	1454	0

1/ Surface area covered

- T = Less than 1%
- 1 = 1 to 20%
- 2 = 21 to 40%
- 3 = 41 to 60%
- 4 = 61 to 80%
- 5 = 81 to 100%

2/ Type of pustule

- 1 = Small, superficial
- 2 = Larger, but still superficial
- 3 = Large, rough pustules
- 4 = Large pustules, shallow holes
- 5 = Large pustules, deep holes.

Uniform Scab Nursery Test

Scab nursery tests were conducted this year in 8 states: California, Maine, Michigan, Minnesota, North Dakota, Washington, Wisconsin, and Wyoming. Data for these tests are found in the reports from these States. In most cases duplicate plots of 5 hills for each variety were planted. Plant Industry table 12 gives the results of the test on the Aroostook Farm, Presque Isle, Maine for 1952.

Several very resistant varieties and seedlings were observed. With a few exceptions, most of the material tested was more resistant than Green Mountain. One Russet type, B 515-2, and several red sorts looked very good.

P. I. table 12. Uniform scab nursery - Presque Isle test, 1952

Varieties or seedling	Rep. 1 <u>1/</u>				Rep. 2 <u>1/</u>				Col- or	Varieties or seedlings	Rep. 1 <u>1/</u>				Rep. 2 <u>1/</u>				Col- or
	Sdlg.		Check		Sdlg.		Check				Sdlg.		Check		Sdlg.		Check		
	Ar	Ty	Ar	Ty	Ar	Ty	Ar	Ty			Ar	ty	Ar	Ty	Ar	Ty	Ar	Ty	
B 73-10	1	2	4	3	Tr	1	3	3	W	B 2922-15	3	3	4	4	1	1	3	3	W
B 402-1	1	2	4	3	1	2	3	3	W	" -26	3	3	4	4	1	1	3	3	W
B 515-2	Tr	1	4	3	Tr	"	3	3	Rus	" -29	2	2	3	3	1	1	3	3	W
B 595-76	1	2	4	3	1	1	3	3	W	B 2924- 2	1	2	3	3	Tr	1	3	3	W
B 904-6	1	2	4	3	3	3	4	4	W	B 2935- 7	2	3	3	3	1	2	3	3	W
B 2067-1	1	2	3	3	3	3	4	4	R	B 2968-56	1	3	3	3	1	3	2	3	W
B 2069-74	Tr	1	3	3	Tr	1	4	4	W	" -66	1	2	3	3	2	3	2	3	W
B 2131-3	Tr	1	3	3	1	2	4	4	R	B 2969-12	1	3	3	3	1	2	2	2	W
B 2162-18	1	1	3	3	1	2	4	4	R	B 3003-27	1	2	3	3	Tr	1	2	2	W
" -36	Tr	1	3	3	Tr	1	4	4	R	-36	Tr	1	3	3	Tr	1	2	2	W
" -49	1	2	3	3	Tr	1	4	4	R	B 3004-9	1	2	3	3	Tr	1	2	2	W
B 2173-22	Tr	1	3	3	Tr	1	4	4	W	B 3008-10	2	3	3	3	Tr	3	2	3	W
B 2331-1	1	2	3	3	1	2	4	4	R	B 3009-7	Tr	2	3	3	Tr	1	2	2	W
B 2337-7	1	2	3	3	1	1	4	4	R	" -9	1	2	3	3	1	2	2	3	W
B 2340-2	1	2	3	3	3	3	4	4	R	B 3014-6	2	3	3	3	Tr	1	2	3	W
B 2368-6	1	3	3	3	3	3	4	4	R	" -15	1	3	3	3	1	2	1	3	W
" -13	1	2	3	3	2	2	4	4	R	B 3015-23	1	3	3	3	1	2	1	3	W
B 2369-4	Tr	1	3	3	1	2	4	4	R	Neb.59.41PI	Tr	1	3	3	Tr	1	1	1	R
B 2861-1	Tr	1	3	3	2	2	4	4	R	N.D.B2336 NI	1	3	3	3	1	3	1	3	W
B 2874-3	2	3	3	3	Tr	3	4	4	R	N.D. 457-1	1	3	3	3	1	1	1	3	W
" -4	1	2	3	3	1	2	4	4	R	Cayuga	Tr	1	3	3	1	2	3	3	W
B 2875-6	Tr	1	2	3	1	2	3	3	R	Seneca	1	1	3	3	Tr	2	2	3	W
" -7	Tr	1	2	3	1	2	3	3	R	Ontario	Tr	1	3	3	Tr	1	2	3	W
B 2879-4	Tr	1	2	3	1	1	3	3	R	Menominee	Tr	2	2	3	Tr	1	2	3	W
" -5	Tr	1	2	3	Tr	1	3	3	R	Progress	Tr	2	2	2	1	3	2	3	R
" -7	1	2	2	3	1	2	3	3	R	M 804	1	1	2	2	Tr	1	2	3	
B 2887-2	1	1	3	3	1	2	3	3	W	330	Tr	1	2	2	Tr	1	2	3	
B 2888-2	1	3	3	3	Tr	1	3	3	W	439	Tr	1	2	2	Tr	1	2	3	
B 2892-3	2	3	3	3	1	2	3	3	W	304	Tr	1	2	2	Tr	1	2	3	
B 2893-11	3	3	3	3	1	3	3	3	W	303.41-40	1	3	3	3	Tr	1	2	3	
B 2900-24	1	2	3	3	Tr	1	3	3	W	" -4	Tr	1	3	3	Tr	1	2	3	
" -42	1	2	4	4	1	2	3	3	W	Rus.Sebago	1	3	3	3	Tr	1	3	3	Rus
" -54	1	2	4	4	Tr	1	3	3	W	Sebago	1	3	3	3	1	3	3	3	W
B 2914-1	4	4	4	4	2	3	3	3	W										
B 2920-13	2	2	4	4	Tr	1	3	3	W										
" -20	2	3	4	4	Tr	1	3	3	W										
B 2921- 4	1	1	4	4	Tr	1	3	3	W										
" -10	3	3	4	4	1	1	3	3	W										

1/ See footnotes in P. I. table 11.

B 515-2 will be released jointly by the U.S.D.A. and the State experiment stations of North Dakota and Idaho. It produces medium-long russet-type tubers. It is early and scab-resistant. These characters make it adapted especially to the early potato-growing sections of Idaho.

Verticillium Wilt Resistance

By R. V. Akeley, D. Folsom, and R. Bonde

The tests for verticillium wilt resistance to infection from infested soil by Verticillium albo-atrum were run again in 1952 on the same field at the Ashby Farm in Caribou, Maine. Four hundred ninety-six seedlings, representing nineteen family lines, and 186 selections from the breeding plot made up a total of 682 5-hill rows that were included in this test. The Katahdin and Kennebec varieties were grown at intervals of 50 rows or 13 times each. P. I. table 13 gives the results for this test.

It is apparent that the 1952 growing season was more favorable for infection than that in 1951. The Katahdin and Kennebec check plot selections averaged 48.6 percent and 86.5 percent, respectively, in 1951. In 1952 all plots for both varieties average 100 percent. On the basis of total tubers in the check varieties Katahdin had an average of 88.9 percent and Kennebec 96.9 percent in 1952. Only 10 out of the 496 seedlings in the family lines remained free from infection and 7 out of the 186 from the breeding plots were free. The family line B 3199, a cross between Ac. 25673 x Menominee, appeared to be the best cross as far as resistance is concerned.

Thirty named or numbered varieties were grown in a wilt-infested field in 20-hill plots replicated 6 times. The data for this test is given in Plant Industry table 14. It is interesting to note the high percentage of infection of many of the standard varieties. The Irish Cobbler showed 95.8 percent infection, Green Mountain 66.7 percent, and Kennebec 81.7 percent, and Russet Burbank 35.0 percent.

The most resistant variety seemed to be 41956, followed by X 792-94 and X 792-88, the latter from a cross of 41956 x Earline. B 595-76, a selection from a cross of 41956 x Cherokee, appeared to have some resistance in California but it was quite susceptible in these tests. Ontario showed the least infection of any of the named varieties.

The yields of several of the varieties were relatively high in spite of the high percentage of infection. Teton ranked first in yield, producing 547 bushels per acre in spite of 74.2 percent infection with verticillium but 7 others were in the same class if the L.S.D. is taken into account.

P. I. table 13. Verticillium wilt resistance test, 5-hill plots on the Ashby Farm, Caribou, Maine, 1952.

Pedigree No.	Parentage	Select-ions tested	Select-ions infected	Select-ions infected	Readings based on total No. hills		Hills infected
		No.	No.	Pct.	No.	Pct.	Pct.
B 3093	Earlaine x (X157-9)	54	53	98.1	217	53	80.4
B 3099	Menominee x (X157-9)	55	54	98.2	248	27	90.2
B 3100	Menominee x (X247-24)	12	12	100.0	56	4	93.3
B 3101	Mohawk x (X157-9)	49	49	100.0	206	39	84.1
B 3102	Mohawk x B 355-44	24	23	95.8	103	17	85.8
B 3103	Mohawk x B 402-1	3	3	100.0	14	1	93.3
B 3116	(X528-170) x B 606-3	42	42	100.0	192	18	91.1
B 3117	(X528-170) x B 929-6	23	23	100.0	108	7	93.9
B 3124	B 595-76 x B 606-3	11	11	100.0	52	3	94.5
B 3125	B 595-76 x B 759-64	4	4	100.0	12	8	60.0
B 3126	B 595-183 x (X528-170)	16	15	93.7	66	14	82.5
B 3191	Kennebec x Menominee	14	14	100.0	69	1	98.6
B 3193	B 595-76 x Menominee	24	24	100.0	102	18	85.0
B 3194	B 595-76 x B 936-12	27	26	96.3	114	21	84.4
B 3196	B 754-16 x Ac. 25673	30	30	100.0	127	23	84.7
B 3197	B 991-3 x Ac. 25673	11	10	90.9	34	21	61.8
B 3199	Ac. 25673 x Menominee	25	21	84.0	87	38	69.6
B 3200	41956 x Menominee	18	18	100.0	74	16	82.2
B 1337	Earlaine selfed	54	54	100.0	212	58	78.5
Family lines total		496	486	98.0	2093	387	84.4
Breeding material		186	179	96.2	787	128	86.0
Check Katahdin		13	13	100.0	56	7	88.9
" Kennebec		13	13	100.0	63	2	96.9

P. I. table 14. Reaction to wilt, yields, and dry-matter content of 30 varieties of potatoes grown in wilt-infested soil at the Ashby Farm, Caribou, Maine, in 1952.

Seedling or variety	U. S. No. 1 yield per acre		Dry matter
	Wilt Pct.	Pct.	
Cherokee	87.5	94	19.2
Chippewa	55.8	94	16.8
Erie	57.5	91	17.7
Essex	52.5	89	16.5
Green Mountain	66.7	94	19.4
Irish Cobbler	95.8	88	18.2
Katahdin	47.5	96	18.0
Kennebec	81.7	96	17.0
Menominee	64.2	97	17.9
Mohawk	69.2	98	19.3
Ontario	13.3	91	17.5
Pungo	98.3	97	17.9

P. I. table 14 continued.

Seedling or variety	Wilt	U. S. No. 1 yield per acre		Dry matter
		Bu.	Pct.	
Russet Burbank	35.0	332	74	19.7
Russet Rural	54.2	371	91	18.7
Sebago	70.8	448	96	17.5
Sequoia	40.0	509	96	17.7
Teton	74.2	547	98	17.8
Triumph	98.3	343	91	16.6
41956	11.7	364	76	20.9
X 96-56	75.0	392	97	18.0
X 792-88	19.2	378	84	18.5
X 792-94	14.2	391	81	20.3
X 927-3	65.8	300	80	18.9
B 73-10	88.3	457	97	18.0
B 355-35	73.3	505	93	18.0
B 355-44	74.2	439	96	19.5
B 447-98	90.0	375	91	17.5
B 515-2	40.8	393	96	17.7
B 595-76	60.8	401	92	20.2
B 606-67	74.2	502	96	20.4
Mean	61.7	425		
L.S.D. 5% level		75.5		0.10

Effect of Sprays on Yield of Certain Varieties of Potato By R. V. Akeley and Raymond Buck

A test to determine the effect of different sprays on yield was repeated in 1952. Six varieties, Katahdin, Sebago, Green Mountain, Cherokee, Pungo, and Kennebec, were included in the test. The four treatments used were: Bordeaux, Bordeaux plus DDT, DDT alone, and no spray. The plots were sprayed at weekly intervals throughout the growing season - 10 times in all.

Climatic conditions during the 1952 season were not favorable for a blight epidemic. The data for this test are given in P. I. table 15.

For all varieties, except Green Mountain, the yields were slightly, but not significantly, higher in the plots with no spray. For Green Mountain, plots sprayed with Bordeaux produced the highest yields.

It is interesting to compare the data obtained in 1952 with the data from a similar test in 1951. The 1951 season was favorable for late blight. In 1951 the yields of the three varieties, Katahdin, Sebago, and Green Mountain were highest in the plots sprayed with Bordeaux + DDT, but the highest yields for the blight-resistant varieties, Cherokee, Pungo, and Kennebec were produced by the plots sprayed with DDT alone. However, in 1952 the plots with no

P. I. table 15. The effect of sprays on the yields of U.S. No. 1 tubers and the specific gravity of the tubers of six varieties of potatoes grown on Aroostook Farm, Presque Isle, Maine in 1952. The yields of U.S. No. 1's per acre are reported in the table.

Varieties	Sprays applied, yield U.S. #1, and specific gravity											
	Bordeaux			Bordeaux + DDT		DDT		No spray				
	U.S. #1	Spec. grav.		U.S. #1	Spec. grav.	U.S. #1	Spec. grav.	U.S. #1	Spec. grav.			
	Bu.	Pct.		Bu.	Pct.		Pct.		Bu.	Pct.		
Katahdin	479	98	1.077	471	98	1.078	459	97	1.078	492	98	1.079
Sebago	450	97	1.075	465	98	1.073	422	97	1.071	499	98	1.075
Gr. Mountain	556	96	1.086	503	93	1.088	454	93	1.084	513	93	1.084
Cherokee	488	97	1.088	469	96	1.088	492	96	1.092	516	96	1.090
Pungo	482	99	1.087	483	98	1.088	470	97	1.086	499	98	1.087
Kennebec	573	97	1.081	553	98	1.081	556	97	1.080	607	97	1.082
Mean	505	97	1.082	491	97	1.083	475	96	1.082	521	97	1.083

Means Bu. Spec. grav.

Katahdin 475 1.078

Sebago 459 1.073

Green Mountain 507 1.085

Cherokee 491 1.090

Pungo 484 1.087

Kennebec 572 1.081

L.S.D. at 5% level for two varieties with the same treatment. Per A. . Spec. Bu. grav.

63.8 0.0038

L.S.D. at 5% level for two variety means

31.9 0.0018

spray yielded higher than the sprayed plots of the same variety, with the exception of the Green Mountain. The mean yield of the Green Mountain sprayed with Bordeaux was significantly higher than any of the other plots of the same variety.

The results for 1952 would indicate that neither late blight nor insects caused measurable reductions in yield. The Kennebec produced consistently high yields for the season and the specific gravity, although not quite as high as that of Pungo, Cherokee and Green Mountain, was sufficiently high to permit the tubers to be classified as bakers.

Early Harvesting

R. V. Akeley, D. Merriam, R. W. Buck, F. J. Stevenson, & R. Bonde

Eight varieties of potatoes were planted on the Aroostook Farm on May 6. Tops were pulled August 15, August 25, and September 4. The vines on the remaining plots were partly killed by frost on September 7 and September 14. All plots were harvested September 22. The data for this test are given in P. I. table 16.

P. I. table 16. Yield and percentage of U. S. No. 1 tubers, number of tubers per hill, and dry-matter content of tubers of eight varieties of potatoes planted on the same date on Aroostook Farm with the tops pulled at 4 different dates.

Tops pulled Date and variety	Yield per acre U. S. No. 1		Mean per hill U.S. #1	Dry matter
	Bu.	Pct.		
August 15				
Mohawk	243	96	3.24	17.2
Sebago	273	95	3.11	14.5
Katahdin	233	90	3.12	15.7
Chippewa	320	93	4.34	15.2
Gr. Mountain	240	84	3.52	17.7
Teton	308	90	4.47	17.7
I. Cobbler	315	91	4.52	19.2
Kennebec	318	95	3.97	16.2
Mean	281	96	3.81	16.7
August 25				
Mohawk	322	97	2.99	18.4
Sebago	361	98	3.22	16.0
Katahdin	333	96	3.55	17.4
Chippewa	396	95	4.29	17.2
Gr. Mountain	353	93	3.84	19.2
Teton	427	96	4.50	19.2
I. Cobbler	429	95	4.96	20.2
Kennebec	427	96	4.29	18.2
Mean	381	96	3.96	18.2

P. I. table 16 continued

Tops pulled Date and variety	Yield per acre		Mean per hill	Dry
	U. S. No. 1		U. S. #1	matter
	Bu.	Pct.		Pct.
September 4				
Mohawk	428	99	3.73	20.9
Sebago	429	98	3.83	18.4
Katahdin	414	98	3.51	19.0
Chippewa	479	97	4.55	18.4
Green Mountain	462	95	4.80	20.7
Teton	544	98	4.75	20.2
I. Cobbler	462	96	4.99	20.9
Kennebec	478	97	4.35	19.0
Mean	462	97	4.31	19.7
September 7-14				
Mohawk	477	99	3.26	19.9
Sebago	500	97	4.24	17.4
Katahdin	483	98	4.16	18.2
Chippewa	522	97	5.10	17.3
Gr. Mountain	537	94	5.33	19.7
Teton	571	98	5.14	19.0
I. Cobbler	430	95	5.03	20.9
Kennebec	546	98	4.75	19.2
Mean	508	97	4.63	18.9
Variety means for all 4 dates of harvest				
Mohawk	368	98	3.32	19.1
Sebago	391	97	3.59	16.6
Katahdin	366	96	3.59	17.6
Chippewa	429	96	4.57	17.0
Gr. Mountain	398	92	4.37	19.3
Teton	463	96	4.72	19.0
I. Cobbler	409	94	4.88	20.3
Kennebec	442	97	4.34	18.2
L.S.D's 5% level	Yield		Tubers	Dry matter
Between dates	36.2		.25	.07
Between varieties	22.6		.28	.03
Between varieties harvested same date	47.1		.57	.05
Between dates, same or different varieties	63.6		.58	.09

The plots on which the vines were pulled August 15 yielded at the rate of 281 bushels of U. S. No. 1 potatoes for a mean of the eight varieties; on August 25, 381 bushels; on September 4, 462 bushels; and on September 7 to 14, 508 bushels per acre. From August 15 to September 7 to 14 there was an increase in yield of 81 percent.

Chippewa ranked first in yield on the earliest date of harvest, August 15; although not significantly higher than Kennebec, I. Cobbler, Teton, and Sebago.

Dry matter increased during the 20-day period, August 15 to September 4. There was a significant decrease in percentage dry matter between the September 4 harvest and the September 7 to 14 harvest. This could be due to the partial killing (50 percent) of the vines by frost on September 7.

Date of Planting

By R. V. Akeley, D. Merriam, R. W. Buck and F. J. Stevenson

The date-of-planting test was repeated in 1952. Plantings of eight varieties were made on May 6, 16, and 26, and June 5. Killing frosts occurred on September 7 and on September 14. The plots were harvested September 22. The data for this test are given in P. I. table 17.

P. I. table 17. Yield of U.S. No. 1 tubers, number of tubers per hill, and percentage of dry matter of eight varieties of potatoes planted on four different dates on the Aroostook Farm, Presque Isle, Maine, in 1952.

Planting date and variety	Yield per acre	Mean per hill		Dry
	U. S. No. 1		U.S. No. 1	matter
	Bu.	Pct.	No.	Pct.
May 6				
Mohawk	508	99	3.63	19.9
Sebago	471	98	3.87	17.7
Katahdin	488	98	4.19	18.2
Chippewa	522	95	5.62	17.7
Green Mountain	525	96	4.73	20.6
Teton	553	97	4.73	18.7
Irish Cobbler	457	96	4.67	20.7
Kennebec	581	98	4.73	18.7
Mean	513	97	4.52	19.0
May 16				
Mohawk	427	98	3.25	19.4
Sebago	440	96	3.38	16.9
Katahdin	415	97	3.37	17.7
Chippewa	510	95	5.00	17.4
Green Mountain	469	93	4.86	19.2
Teton	536	98	4.47	17.9
Irish Cobbler	439	96	4.77	19.4
Kennebec	496	96	3.96	18.2
Mean	466	96	4.13	18.2

P. I. table 17 continued.

Planting date and variety	Yield per acre		Mean per hill	Dry
	U.S. No. 1		U.S. No. 1	matter
	Bu.	Pct.	No.	Pct.
May 26				
Mohawk	328	98	3.34	18.9
Sebago	323	92	3.19	15.9
Katahdin	349	96	3.46	17.7
Chippewa	392	95	3.60	17.3
Gr. Mountain	378	95	3.64	17.8
Teton	437	98	3.95	17.8
I. Cobbler	362	96	4.07	19.4
Kennebec	448	97	3.64	17.9
Mean	377	97	3.61	17.7
June 5				
Mohawk	208	96	2.52	17.9
Sebago	184	86	2.38	15.7
Katahdin	227	90	2.83	17.4
Chippewa	255	94	2.65	16.2
Gr. Mountain	259	89	3.37	17.7
Teton	251	92	2.92	16.2
I. Cobbler	247	91	3.27	18.2
Kennebec	307	94	3.04	16.7
Mean	242	92	2.87	17.2
Variety Means				
Mohawk	368	98	3.19	19.0
Sebago	355	93	3.21	16.6
Katahdin	370	95	3.46	17.8
Chippewa	420	95	4.22	17.2
Gr. Mountain	408	93	4.15	18.8
Teton	444	96	4.02	17.7
I. Cobbler	376	95	4.20	19.4
Kennebec	458	96	3.84	17.9
L.S.D. 5%				
Between dates	27.8		.34	.04
Between variety means	20.8		.32	.02
Between varieties planted same date	41.6		.63	.05
Between dates same or different varieties	47.8		.68	.04

The average mean yield of 513 bushels of U.S. No. 1 potatoes per acre for the eight varieties planted on May 6 was the highest for the four planting dates. The average mean yields for May 16 and 26 and June 5 ranked second, third, and fourth, respectively.

There were significant differences between the number of U.S. No 1 tubers per hill for the four dates. The first planting date, May 6, ranked first; May 16, second; May 26, third; and June 5, fourth. The differences in mean percentage of dry matter for the four dates was also significant. These ranked in the same order as yield and the number of U.S. No. 1 tubers with the May 6 planting date ranking first.

Spindle Tuber Test
R. Akeley, R. Bonde, and D. Merriam

Spindle-tuber virus is an old problem in potato culture. No true resistance has yet been found. Formerly it was thought that most of the spread of this virus was due to seed-cutting knives and the pickers in the self-feeding potato planters. It is now known that spread in the field can be accomplished to a high degree by diseased foliage contacting the healthy type. Switching healthy plant vines with diseased ones has given as high as 100 percent infection.

This year 30 varieties and seedlings were planted in 6 randomized blocks with 20 seed pieces per plot. When the foliage was about 1 foot in height all the plants were switched with vines known to have spindle tuber. At harvesttime the hills were all sampled and will be replanted again in 1953 to determine the amount of infection obtained. The tuber-graft method is too severe but it is hoped that the switching method will show varietal differences to spindle tuber infection.

Virus A Resistance. Seedling Potato Varieties Exposed to Mild Mosaic Green Mountain in the Field, Aroostook Farm, Presque Isle, Maine, 1952. Inarch Grafted to Green Mountain, Beltsville Greenhouse, January 1953.

E. S. Schultz

Five hills of each of 471 seedling potato varieties, the progeny of 14 crosses and selfed varieties, were planted in alternate hills with mild mosaic (viruses A + X) Green Mountain. When the plants were in blossom mild mosaic leaflets infested with Myzus persicae were deposited on every hill to supplement field infestation. One tuber per hill was harvested for inarch grafting in the greenhouse for diagnosis of virus A susceptible varieties. From 4 to 93 varieties were represented by the different crosses. Resistance to late blight, common scab, and virus A, X, and Y, and leaf roll is harbored by different parents. Results of this test are given in P. I. table 18.

Observations on the reaction of the seedling potato varieties to virus A disclosed that some varieties manifested distinct mottling, some slight rugosity, some lighter green than healthy leaves, and some no mosaic symptoms. The progeny of 5 crosses did not contract virus A while 3 to 34 percent of the varieties in 10 crosses contracted virus A. Every hill of the 45 hills in the Green Mountain controls contracted virus A, which shows that most of the seedling potato varieties in the test are highly virus A resistant.

P. I. table 18. Virus A resistance. Seedling potato varieties exposed to mild mosaic Green Mountain in the field where viruliferous *Myzus persicae*, 50 to 100 aphids, were deposited on every hill when plants were in blossom. Presque Isme, Maine, 1952. Inarch grafted to Green Mountain O. E. H. S. Beltsville greenhouse, January 1953.

Pedigree	Parentage	Varieties No.	Reaction of varieties to:		
			Virus A Pct.	Other diseases Type	Pct.
B 3093	Earlaine x (X 157-9)	54	7	1/	
B 3097	Kennebec x B 991-13	93	23	Lr	19
B 3098	Kennebec x B 1034-94	5	0	TN	100
B 3101	Mohawk x (X 157-9)	49	22	Lr	47
B 3105	TI5 x Katahdin	4	0	TN	100
				LR	50
B 3156	B 879-1 x Kennebec	4	25	TN	50
B 3169	B 929-6 x B 983-9	29	7	Lr	38
B 3173	B 983-8 x B 606-3	25	0	Lr	64
B 3175	B 983-9 x Ruska	42	9	Lr	14
				TN	9
B 3177	B 983-9 x B 606-3	18	0	Lr	22
B 3180	B 985-6 x B 991-13	6	16	Lr	16
B 3207	Kennebec x B 922-3	16	0	Lr	6
				TN	32
B 3208	Kennebec x Earlaine	32	34	Lr	32
B 3209	Katahdin x B 2067-52	38	3	TN	68
				Lr	29
B 1337	Earlaine selfed	48	14	Lr	14
	Kennebec	1	0		
	Mohawk	1	100		
	Katahdin	1	0	TN	100
	Teton	1	0	TN	100
	Earlaine	1	0		
	X 157-9	1	0		
	B 2336 N 1	1	0	TN	100
	Green Mountain controls	45	100	Lr	22

1/ Lr = Leaf roll

TN = Top necrosis caused by virus X.

Chips and French Fries Made From Date of Planting Tests
By Robert V. Akeley

In 1952 the date-of-planting test consisting of 8 varieties grown in 4 replications at 4 different planting dates was again planted to further study the effects of date-of-planting on yield, specific gravity, and frying qualities. In this test 8-16-16 fertilizer was used at the rate of 1,400 pounds per acre on second-crop potato land. The usual cultural methods for potatoes for this area were used. Samples from each replication were started at temperatures not lower than 40°F. until December 5, 1952, when they were moved into a temperature-controlled store room and kept at 60° for 59 days, for the samples to be fried, and 67 days, for similar material to be chipped.

At the end of the conditioning period two square $\frac{1}{2}$ -inch plugs were taken from 5 tubers of each sample. The 10 plugs were cooked in pure vegetable oil (Primex) for $4\frac{1}{2}$ minutes at a temperature range of 375° to 385° F. After cooling the samples were judged for color and texture. The same procedure was used for the chipping samples up to the time they were cooked. Two center slices, slightly less than 1/4-inch in thickness, were taken from 5 tubers from each sample. The 10 slices were rinsed with water to remove excess starch, blotted dry with paper towels, and then cooked at a temperature range of 335° to 345° F. until cessation of bubbling.

The french fries and chips were arranged in 7 classes according to the degree of browning. The footnote in P. I. table 19 shows the classes for various degrees of browning.

In actual practice the trade seems to prefer class 5 (medium light brown) for frozen french fries, and class 4 (medium brown) for potato chips. A fairly light-colored product is desirable since the processor ^{can} darken them at will by the use of sugar. The color readings were made by two people who agreed on each score before it was recorded.

The chip quality ratings for the 8 varieties for the date-of-planting tests are given in P.I. table 19. The differences between dates and between varieties are significant. The same dates, May 6 and 16, were best for chipping. The Kennebec was highest in rating for all dates, with the Irish Cobbler second, except for May 16, and Chippewa third. All varieties in general would be satisfactory for chipping except Green Mountain and Mohawk.

The french fry quality ratings for the 8 varieties for the date-of-planting tests are given in P.I. table 20. It is evident that there are significant differences between dates of planting with the May 6 and 16 dates being the best. The Kennebec variety had the highest class rating for all dates, the Chippewa second, and Irish Cobbler third. All 8 varieties would be acceptable except Green Mountain and Mohawk this year.

P.I. table 19. Chip quality ratings for 8 varieties of potatoes planted on 4 different dates but harvested on the same date and for the same varieties planted on the same date but harvested on 4 different dates, on the Aroostook Farm, Presque Isle, Maine in 1952

Variety	Class means for planting dates 1/					Class means for harvest dates 1/				
	5-6	5-16	5-26	6-6	Means	8-15	8-25	9-4	9-11	Mean
I. Cobbler	5.95	5.58	4.58	3.00	4.78	4.05	4.35	6.10	5.58	5.02
Katahdin	4.58	4.43	3.75	3.28	4.01	2.88	2.95	5.10	4.88	3.95
Gr. Mountain	3.00	2.63	1.25	1.13	2.00	1.50	2.00	2.95	2.30	2.19
Teton	4.55	4.85	4.38	2.75	4.13	3.40	4.35	5.15	4.80	4.43
Mohawk	4.23	4.60	2.55	2.33	3.43	2.38	3.08	3.98	4.18	3.40
Sebago	4.93	4.73	3.95	3.93	4.38	3.88	4.13	5.45	5.10	4.64
Chippewa	4.78	4.90	4.83	4.00	4.63	3.50	3.85	5.35	4.98	4.42
Kennebec	6.70	6.38	5.48	4.95	5.88	4.75	4.83	6.13	6.38	5.52
Mean	4.84	4.76	3.84	3.17	4.15	3.29	3.69	5.03	4.77	4.19

1/ 5% level between dates, 0.23	5% level between dates, .57
" " " varieties 0.34	" " " varieties .46
" " " " same date 0.69	" " " " .92
" " " " or different dates, 0.68	5% level between varieties on different dates, 1.03

Quality ratings based on degree of browning

Class	Degrees of browning
1	Very deep brown
2	Deep browning
3	Medium deep browning
4	Medium browning ✓
5	Medium light browning ✓ FFF
6	Light browning
7	Very light browning.

P.I. table 20 French fry quality ratings for 8 varieties of potatoes planted on 4 different dates but harvested on the same date and for the same varieties planted on the same date but harvested on 4 different dates, on the Aroostook Farm, Presque Isle, Maine, 1952.

Variety	Class means for planting dates 1/					Class means for harvesting dates 1/				
	5-6	5-16	5-26	6-6	Variety means	8-15	8-25	9-4	9-11	Variety means
I.Cobbler	5.30	5.03	4.95	3.88	4.79	4.20	4.60	4.98	5.65	4.86
Katahdin	4.70	4.88	4.20	4.03	4.45	3.80	3.73	5.00	4.70	4.31
Gr.Mountain	3.18	3.18	2.55	1.88	2.70	2.00	2.10	3.03	2.73	2.46
Teton	5.00	4.83	4.30	2.70	4.21	4.13	4.45	4.95	4.73	4.56
Mohawk	3.98	3.90	3.30	2.23	3.35	3.03	3.48	4.63	3.90	3.76
Sebago	4.90	4.95	4.60	4.00	4.61	4.25	4.35	4.95	4.83	4.59
Chippewa	5.45	5.25	5.35	4.50	5.14	3.90	4.33	4.93	5.20	4.59
Kennebec	5.85	5.90	5.25	5.13	5.53	5.30	5.35	5.90	5.65	5.55
Class means	4.79	4.74	4.31	3.54	4.34	3.82	4.05	4.79	4.67	4.33

1/ Quality ratings based on degree of browning			Harvesting Dates		
Classes	Degree of browning		L.S.D.	5% level between dates	
1	Very deep browning		"	"	" "var. means 0.46
2	Deep browning		"	"	" " " "var. means 0.37
3	Medium deep browning		"	"	" " " "var. means 0.74
4	Medium brown		"	"	" " " "var. means 0.74
5	Medium light brown		L.S.D.	5% level between dates	
6	Light brown		"	harvested same date	
7	Very light brown		"	harvested for same or different varieties	

Planting Dates

L.S.D.	5%	level between dates	0.29
"	"	" " variety mean	0.31
"	"	" " " planted same date	0.63
"	"	" " dates planted for same or different variety	0.66.

Chips and French Fries Made from Date of Harvesting Tests

In 1952 the date-of-harvesting test consisting of 8 varieties grown in 4 replications was planted on May 6. The tops were pulled from the first lot on August 15, the second August 25, the third September 6, and the frost killed the vines partially on September 7 and completely on September 14 with a mean date of September 11. The methods and procedure of storing and cooking the material in this test are the same as those used in the date-of-planting test.

The chip quality ratings for the 8 varieties for the date-of-harvesting are given in P.I. table 19. The same conditions hold again for differences between dates and variety comparisons.

The french fry quality ratings for the 8 varieties are given in P.I. table 20 for the date-of-harvesting test. The last two dates, September 14 and 11, are significantly higher than the first two. Kennebec was highest again and made satisfactory french fries regardless of when it was harvested. All varieties made an acceptable chip on the last two dates of harvest except the Green Mountain.

Southern Project
(Louisiana Headquarters)
T. P. Dykstra

The greenhouse and laboratory work of the potato-breeding program of the Southeastern States is conducted at headquarters at Louisiana State University, Baton Rouge, in close cooperation with Dr. Raymon Webb. The increase plots of first-year seedlings and later selections are maintained in isolated plots at the Plateau Experiment Station at Crossville, Tenn. This work is in close cooperation with Mr. T. R. Gilmore of that Station.

The program has been continued to complete the objectives as stated in previous reports. The main emphasis has been placed on the development of early, high-yielding red-skinned varieties, resistant to late blight and scab, well adapted to growing conditions of the deep South, as well as to those of the seed-producing areas in the North. An effort has been made also to develop high-yielding white varieties of medium maturity, resistant to late blight and well adapted to the high elevated late-maturing sections of Tennessee, Georgia, and North Carolina.

In making selections in the increase plots in Tennessee, seedlings that do not have any resistance to disease are discarded unless they have desirable commercial characteristics, are fertile, and can be used as parents to combine these characters with disease resistance. A large number of white seedlings, resistant to late blight, are maintained in the increase plots, and some of these are also scab resistant, in combination with desirable commercial characters. These are being increased to test for adaptability on a large scale.

Several red seedlings are propagated that are resistant to late blight but are undesirable commercially. About 20 red seedlings that are resistant to late blight and also possess several desirable commercial characteristics have been selected. A few of these have excellent shape and color, but their yield is lower and the size is smaller than commercially grown red, blight-susceptible varieties. Some of the red blight-resistant seedlings are vigorous and produce a satisfactory yield, but are undesirable from the standpoint of color, shape, and maturity.

A successful effort is being made to combine the desirable features in crosses and to select for red, blight-resistant types.

On account of unfavorable climatic conditions prevailing in the South a high percentage of successful crosses is not always assured. Some of the seedlings and varieties desired as parents fail to bloom, and in others the flowers dehisce readily. In some years fairly satisfactory weather conditions prevail during flowering, and some good crosses can be made. The year 1952 was not such a year; high temperatures and lack of humidity prevailed at the Cumberland Plateau in Tennessee where the increase and breeding plots are located. Very few crosses were successful, and those seedlings that ordinarily develop a large number of seedballs due to open pollination failed to produce any seedballs this year.

Dr. F. J. Stevenson has made several crosses in Beltsville, using some of our seedlings as parents and combining these with increased resistance and improved commercial qualities. Seed obtained from these crosses were sent to Baton Rouge where it was grown in the greenhouse. This assistance and cooperation has been extremely helpful.

This year potato seed was sowed in large clay saucers containing vermiculite. After the seedlings emerged they were watered once a week with a nutrient solution, and with tap water the rest of the time. Saucers containing seedlings obtained from crosses, of which at least one of the parents was blight resistant, were placed in a moist chamber, in a storage room at 65°F. under artificial light, and inoculated with a water suspension of zoospores of Phytophthora infestans, the causal organism of the late blight disease. The susceptible seedlings in the progeny were killed, and the resistant ones, not affected by the fungus, were transplanted into 3-inch pots in the greenhouse, where they were grown to maturity. One tuber from each seedling in each progeny was saved and planted under the progeny number in the isolated plots at the Plateau Experiment Station, Crossville, Tenn. for increase, observation, and selection.

In testing for resistance to late blight, the common strain A of Phytophthora infestans is being used exclusively. As far as is known, this is the only strain of this fungus found on blight-infected potato plants in the South. Kennebec and Pungo, resistant only to Strain A of the fungus, remain free from infection whenever late blight occurs in epidemic proportion in the Southern States.

A number of reports of late blight on Kennebec have been received, but whenever these were investigated, it was found that either the disease was not late blight, or that late blight was found on susceptible varieties mixed in a field supposedly planted only with Kennebec.

It is realized that eventually more virulent strains of the causal organism may appear in the South. In view of this it is desirable to have varieties resistant to all the known strains of Phytophthora, but unless it is known that some of these strains are already present in the South, it is not considered advisable to inoculate seedlings in this area with the more virulent strains of Phytophthora infestans. It will be best to limit these tests to those areas where these virulent strains are already established.

From the National Potato-Breeding Program, through Dr. Stevenson, a number of seedlings resistant to several strains of this fungus have been obtained. Some of these seedlings appear to be equally promising commercially especially in areas where a white variety is desired. These seedlings are being increased for a more intensive test for adaptability in different Southern States.

An additional test for blight resistance is made of those seedlings that previously had been tested for blight resistance in the first-year seedling stage. After selection has been made in the field, on the basis of desirable horticultural and commercial characters, three seedpieces of tubers of each selected seedling are planted in 4-inch pots in the greenhouse.

After these plants are about 8 inches high, they are placed in a moist chamber and inoculated with blight spores.

First-year seedlings have been tested for scab resistance in scab-infested soil in cold frames heated by electric cables. In spite of repeated applications to the soil of the scab organism, manure, and lime, uniform scab infection on the seedlings has not been obtained consistently. Antibiotic activities may be responsible for this.

This year, as a preliminary experiment, seedling progenies are being planted from scab-resistant parents in a greenhouse bench in vermiculite to which a nutrient solution will be added and inoculated with the scab organism. If this procedure proves to be successful, plans will be made to test for scab resistance in first-year seedlings by this method on a larger scale.

In selecting seedlings to be tested by the cooperating States, from now on the practice of sending only enough tubers to plant in an observation plot will be discontinued. Although growing a relative/Small number of hills may give an indication of the relative desirability of a seedling, it makes it difficult to properly evaluate these. From now on, cooperators will be sent sufficient tubers to plant at least 4 replications of 25 plants each in a yield plot. If lack of sufficient material prohibits shipment of this amount to each cooperator, preference will be given to those localities where, on the basis of past experience, satisfactory yields may be expected. When more tubers of the more promising seedlings become available, a sufficient number will be shipped to those areas where crop failures are more apt to occur. Dykstra table 1 gives the number of seedling varieties sent to cooperators in the fall of 1952.

Dykstra table 1. Number of seedling varieties sent to cooperating States in the fall of 1952, in sufficient number to plant a yield plot.

State	Seedling varieties	Resistant to blight	Resistant to scab	Red seedling	White seedling
	No.	No.	No.	No.	No.
Alabama	29	7	15	25	4
Florida, Homestead	32	3	24	32	0
Florida, Hastings	27	22	2		27
Florida, Belle Glade	14	12	2		14
Georgia, Mountain Sta.	10	10	0		10
Georgia, Savannah	16	8	4	6	10
Louisiana	24	9	5	20	4
Mississippi	15	5	7	13	2
North Carolina	21	10	3	6	15
South Carolina	15	11	2		15
South Dakota	42	32	14	15	27
Tennessee	17	16			17
Texas	47	7	21	43	4

Emphasis is placed upon different characteristics required to meet the demand in each State. In some areas red varieties resistant to blight are desired, but scab is of minor importance. In other areas, scab is prevalent and scab resistance is desired in red varieties. This is true of the Homestead section in Florida where a mild strain of scab is commonly present. In other areas, emphasis is placed upon early-maturing blight-resistant white varieties. In making selections for the various cooperators, the requirements for their areas are always kept in mind.

Whenever possible the writer visits at least once a year, preferably at digging time, the plots of the cooperators, in order to evaluate the seedlings in different areas. The State cooperator assumes the responsibility of the planting and general care of the plots.

On account of high temperatures and drought, near crop failures resulted in the plots in Texas, Mississippi, and North Carolina. In most of the other States fair to satisfactory growing conditions prevailed.

Summaries of Reports from Different Cooperators

J. E. Bailey of the Georgia Mountain Experiment Station at Blairsville, Georgia, reported:

This area in the Mountain section of Georgia ordinarily provides satisfactory conditions for the production of potatoes. A white variety is preferred. On account of a hot and very dry growing season, the yields of the seedling tested were very low. Seedlings 338, 363, 599, 1192, ¹⁵⁵⁹and 1345 gave a very satisfactory performance under these adverse growing conditions and should be tested again on a larger scale next year.

W. M. Epps reports from Clemson College Truck Experiment Station, South Carolina, that seedlings 1337, 1823, 2055, 2103, and 2219 made very good yields and had excellent tuber shape. A request was made for a sufficient number of tubers from these seedlings to be used in a yield test next year. Seedling 580, 584, 1894, 2109, 2349, 3273, and 3600 also looked worthy of further tests but had one or more undesirable characteristics.

The preference in South Carolina is for an early, high-yielding blight-resistant white tuber of a desirable shape. Late-maturing varieties are more apt to develop nematode damage, transit breakdown, and excessive sunscald.

W. S. Anderson reported that the very extensive yield plots of different seedlings planted at the substation at Newton, Mississippi, this year resulted in failure. Because of severe drought and high temperatures, the yields were low, and weather conditions affected the shape of tubers and also caused heat sprouts to develop, so it was useless to evaluate the seedlings on the basis of this year's performance.

A. H. Eddins, of Hastings, Florida, reports that approximately 15,500 acres were grown in the Hastings area in 1952. Of this acreage 95 percent was planted to Sebago. Miscellaneous varieties grown were Red Pontiac, Irish Cobbler, Red Warba, Kennebec, and Cherokee. Table 2 indicates performance of seedlings grown at Hastings, Fla.

Dykstra. Yields and other characteristics of potato seedlings grown at table 2. Hastings, Florida, in 1952.

Seedling Nos.	Parentage	Set	Yield	Eye depth	Maturity	Late blight
580	Mohawk x 96-56	Medium	Good	S	3	None
632	Houma x 96-56	"	"	S	4	"
658	Sebago x 47156	"	"	S	5	"
1236	" x L372-1	Heavy	"	S	5	"
1551	No Blight x 47156	"	"	S	5	Present
1823	L313-1 x L164-3	Medium	"	S	4	"
1894	Sebago x B 81-40	Heavy	Medium	M	5	None
1928	792-94 x 96-56	"	"	S	4	"
2055	Ostbote x Katahdin	Medium	"	M	5	Present
2103	Katahdin x Triumph	"	"	M	5	"
2109	B 81-40 x 927-3	Poor	"	S	3	None
2188	1276-185 x 96-56	Medium	"	D	5	"
2215	B 76-23 x Chippewa	"	"	M	5	Present
2219	B 76-23 x Chippewa	Poor	Poor	S	3	"
2349	B 56-1 x B 594-46	Medium	Good	M	2	None
2396	B 76-23 x 792-94	Poor	Poor	S	1	"
2402	" x "	"	"	M	4	"
2461	B 381-2 x 96-56	Medium	Medium	M	2	"
2473	" x "	"	Good	M		"
2988	B 61-3 x Katahdin	"	"	M	3	
3061	B 2076	Poor	Poor	M	4	None
3260	B 2722	Very poor	Very poor	S	2	"
3266	TI ₅ x B 355-24	Medium	Medium	S	3	"
3269	" x "	Poor	Poor	S	3	"
3273	" x "	Heavy	Good	M	3	"
3284	B 81-40 x 245-186	Medium	Medium	M	3	"
3674	B 446-54 x Teton	Heavy	Good	M	5	"
3675	" x "	Medium	Poor	M	5	"
3676	" x "	Heavy	Medium	M	3	"
3684	" x "	Medium	Poor	M	2	"
3733	B 779-9 x B 434-57	"	Medium	S	3	Present
3769	Kennebec x B 522-33	"	Good	S	1	"
3778	B 355-24 x B 446-58	"	Medium	D	2	None
3951	B 61-3 x B 402-1	"	"	M	4	"
3954	B 76-23 x 157-9	Heavy	"	S	3	"
3956	" x B 445-41	Medium	Poor	S	5	"
3962	" x "	Poor	"	M	5	"
3888	B 606-37 x B 607-56	"	Very poor	S	3	"
3996	B 70-5 x B 445-41	Medium	Good	S	4	"
4063	B 606-37 x B 607-56	Very poor	Very poor	S	3	"
2215	B 76-23 x Chippewa	Medium	Medium	M	2	Present
LD 81-185	B 56-1 x 76-23	"	Good	D	3	None

John C. Noonan reports from Homestead, Florida, that the primary requirement for Dade County area is a red-skinned variety resistant to late blight and scab to replace Pontiac and Dakota Chief.

Seedlings Nos. 2681, 2724, 3048, 3207, ³²⁷⁶4001, and 4058 were outstanding in comparison with other seedlings and should be tested again on a larger scale. Table 3 indicates performance of seedlings planted at Homestead, Fla.

Table 3. Performance of potato seedlings grown at Homestead, Florida, in 1952.

Seed- ling Nos.	Parentage	Shape of tubers	Color	Scab	Starch		Ave. wt. of tubers
					Pct.	Gm.	
366	(Pontiac x Triumph)x 56-1	Fair	Poor	None	10.7	163	
368	" x " "	Blocky	Fair	Present	12.9	247	
1337	Pontiac x 15-2	Good	"	None	13.9	183	
1393	148-99 x 179-26	"	Good	"	12.2	162	
1396	176-26 x 179-26	Fair	Deep red	"	12.9	196	
1404	176-26 x 179-26	"	Fair	"	12.9	170	
1859	Pontiac x 96-56	Good	Light red	"	12.9	230	
2459	B 381-2 x 96-56	"	Fair	"	11.7	160	
2670	B 56-11 x B 56-1	Blocky	Russet red	"	12.9	126	
2671	" x "	Small	Fair	"	12.9	97	
2681	" x "	Blocky	Good	"	12.9	150	
2687	" x "	"	"	"	12.2	133	
2724	1276-185 x B 61-3	Good	Fair	"	12.9	156	
2766	B 56-11 x 528-170	Irreg.	"	Present	13.9	126	
2773	" x "	Longitud- inal	"	None	16.0	125	
2778	" x "	Not uni- form	"	"	12.9	131	
2786	B 381-2 x B 56-1	Irreg.	Good	"	14.9	177	
2794	B 400-1 x 528-170	Fair	Fair	"	12.9	172	
2867	Col. 7846	Irreg.	"	"	10.7	160	
3043	B 2061-18	V. good	Good	"	13.9	108	
3048	B 2118-63	" "	"	"	15.4	114	
3058	B 2162-49	Blocky	Fair	"	13.9	180	
3060	B 2216-62	Poor	Pink	"	13.9	143	
3756	B 381-2 x B 434-57	Small	"	Present	12.2	75	
3807	B 578-39 x B 446-8	Good	"	None	10.7	153	
3916	Ultimus x B 56-1	Poor	"	"	11.7	144	
3917	" x "	Fair	Fair	"	12.9	99	
3928	B 56-11 x "	Irreg.	Good	"	11.7	180	
3943	" x B 400-1	"	"	Present	11.7	180	
3946	" x "	"	"	"	12.9	137	
3948	" x "	Good	"	None	10.7	115	
3949	" x "	"	"	"	12.9	118	

Table 3 continued

Seed- ling Nos.	Parentage	Shape of tubers	Color	Scab	Starch	Ave. wt. of tubers
					Pct.	Gm.
3965	B 490-1 x B 56-11	Good	Good	None	14.4	94
3972	Pontiac x B 400-1	Fair	Pink	"	11.7	160
3979	" x "	Blocky	Fair	Present	12.9	180
3980	" x "	"	Deep red	None	12.9	133
3982	B 381-2 x B 56-1	Fair	Dark pink	"	15.4	137
3983	" x "	Poor	Fair	"	15.4	137
3987	B 400-1 x "	Irregular	Good	"	10.5	150
4001	B 381-2 x "	V. Good	"	"	11.7	168
4036	B 56-11 x B 381-2	Blocky	Light red	"	15.4	150
4058	B 381-1 x B 56-1	Good	Deep red	"	12.2	135
Triumph		Blocky	Fair	Present	10.5	200
Dakota Chief (Pontiac)		"	Good	"	10.5	264

H. G. Ukkelberg reports from the Substation at Fleming, Georgia, in the vicinity of Savannah, that more white potatoes are grown in that area than reds. The seedlings 1859, 338, 366, and L.D. 82-257 gave very satisfactory performance on the basis of color, shape of tuber, and yield.

Frank L. Haynes, of North Carolina, reported that on account of a heavy rain in early March, planting was delayed, and a heat wave in early July, accompanied by severe drought conditions, caused so much damage that any data on the performance of seedlings this year would be of dubious value.

Most of the seedlings sent to Louisiana are planted in this State's increase plot maintained in South Dakota. After the seedlings have been increased in this area, selections are planted in yield plots in Louisiana. A report of these activities appears as a separate report under Louisiana.

The work in Texas is conducted cooperatively with the Missouri Pacific Railroad Company and the Weslaco Branch Agricultural Experiment Station. Extensive tests, including 93 seedlings, were planted in the Rio Grande Valley at San Benito and Weslaco. The growing season this year was extremely unfavorable. Early in the spring two freezes damaged the plants. This was followed by unusual dry weather and strong drying winds. In addition, there was a shortage of irrigation water. For the first time in 7 years there was an infestation of psyllids on potatoes. As a result, the yields were extremely low, as reported in table 4. The 40-hill lots planted at Weslaco did not provide sufficient reliable data to include in the report.

Dykstra

Table 4. Yield of potato seedlings and varieties grown at San Benito, Texas, 1952.

Seedling Nos.	Parentage	Starch Percent	Yield per acre Bu.
338	96-44 x 528-170	11.85	45
366	(Pontiac x Triumph) x 56-1	9.98	30
368	(" x ") x "	12.92	71
658	Sebago x 47156	9.78	61
667	La 896	10.72	45
1345	Pontiac x 15.2 selfed	11.85	75
1354	Pontiac x 92-36-5	11.85	69
1393	148-99 x 179-26	9.98	50
1396	176-26 x 179-26	12.92	75
1404	176-26 x 179-26	11.85	45
1551	47156 x 528-118	11.85	75
1859	Pontiac x 96-56	10.72	102
1894	Sebago x B 81-40	12.92	77
2109	B 81-40 x 927-3	13.92	120
2215	Chippewa x 76-23	9.07	41
2402	B 76-23 x 792-94	12.92	85
2471	B 381-2 x 96-56	11.85	28
3043	Chippewa x B 381-2	9.78	25
3978	Pontiac x B 400-1	11.85	85
73-10		10.72	36
20-42-9	Nebraska red seedling	9.98	65
25-42-2	" " "	10.72	87
26-44-1	" " "	11.85	82
43-41-1	" " "		55
87-46-3	" " "	12.92	80
89-46-2	" " "	10.72	33
127-46-1	" " "	10.72	70
190-38-6	" " "	9.98	95
204-43-1	" " "	9.98	51
209-43-1	" " "	9.78	120
Triumph		9.98	47
La Soda		10.72	54
Kennebec		12.92	68
Pungo		10.72	25

L.S.D. 5% = 22 bushels

U.S. - COLO. POTATO FIELD STATION (Greeley, Colo.)

W. C. Edmundson

Potato-breeding studies for 1952 consisted of breeding for scab resistance, with good cooking quality, using both red and white varieties. Some of the parent material was supplied from Beltsville; to this was added the most promising scab-resistant lots developed at Greeley. A number of seedlings supplied from Beltsville carried a factor for blight resistance.

The 1952 tests included the first-year seedlings in family lines, second-year seedlings in 5-hill lots, increase plots in 32-hill lots, testing of older seedlings on a field basis, and yield test of seedlings.

In addition to test plots at the Station, the more promising seedlings were tested on two farms in the early potato section at Gilcrest, Colo. Seedlings were also supplied for tests in other parts of the State. Seedlings were also supplied to Dr. L. A. Schaal for scab-resistance studies at different locations throughout the State.

The growing season of 1952 was favorable for potato production in the Greeley district and throughout the State. The yield per acre for the district was high and the quality of the crop was good.

There was, however, a reduction in the acreage planted to the late crop. There was a light infection of late blight but very little tuber rot. Flea-beetle injury was rather severe in some fields even though well sprayed or dusted with DDT. The precipitation was very low for the growing season of 1952. There was but 1.43 inches of rain recorded at the Station from the first of June until after harvest. The psyllid population was low, according to counts made in the check plot of the spraying experiment. All seedling plots were sprayed five times with DDT and Parzate.

The 1952 family lines were planted May 14. Planting the family lines the middle of May has given better results than planting the first of June. Much difficulty was experienced at the time of harvest in making selections, owing to the large number of promising seedlings. This was true with the white crosses but not with the red crosses. Nine hundred fifty-three seedlings have been selected for testing in 1953, but very few of these are of good red color.

One-thousand fifty-eight seedlings were included in the test of second-year seedlings planted in 5-hill lots. Owing to the favorable growing season a large number of seedlings appeared promising at the time of harvest. These lots have been re-examined this winter, and all lots infected with scab or indicating a tendency to growth cracks have been discarded. All lots that were retained for further test will be planted on a tuber-unit basis in 32-hill lots. Each lot will be tested for scab resistance in 1953.

One hundred eight older seedlings were planted in 32-hill lots on a tuber-unit basis. All lots were retained at time of harvest for closer study. All of these lots were later spread out on the greenhouse benches and carefully examined for scab, growth cracks, and other defects. The best of these lots have been retained for planting at the Station in 1953. The most promising of these lots will be planted at Gilcrest for the early crop and also in

other parts of the State.

Twenty-four of the older seedlings were planted on a field basis in tuber units; some were planted in half-row plots, some in full-row plots 535 feet long, others were planted in large lots. Seedling 6362 that had appeared to be very promising was rather disappointing this year at the Station, but did exceptionally well in commercial fields in the early district, grading 99% No. 1 in one field.

Seed from 52 crosses which was developed from crosses made last winter in the greenhouse was planted in the greenhouse on August 11. Owing to delayed germination of some seed, the plants were potted September 15 and 16 and October 6. The lots that were potted on the earlier dates produced larger tubers than the ones potted later. Seed from 21 crosses in which red parents were used were included in the plantings; however, only a small number of dark-red tubers were obtained. A list of red parent crosses, together with the number of dark red, medium red, light red and white tubers produced is given in Edmundson table 1.

Edmundson table 1. 1953 seedlings - family lines, red crosses, Greeley, Colo.

Cross No.	Parentage	Rus. No.	Dark red No.	Med. red No.	Light red No.	White No.	Total No.
37	Ia 46-18-1 x B 2159-1		7	5	19	29	60
38	B 899-42 x CS 9551	39	1	1	3	64	108
39	IA 46-18-1 x B 400-1		3	14	62	76	155
40	Neb. 113-43-1 x B 381-2		4	7	41	59	111
41	B 400-1 x B 874-108			12	38	121	171
42	B 400-1 x CS 7702				42	91	133
43	CS 9887 x B 400-1		2	7	87	194	290
44	IA 46-18-1 x B 2131-3			7	29	94	130
45	CS 9887 x B 2131-3			1	30	155	186
46	CS 9741 x B 400-1			2	7	254	263
47	B 2340-2 x CS 10585				10	93	103
48	B 2339-2 x "			1	8	91	100
49	B 2159-1 x "			2	56	148	206
50	B 56-11 x CS 7702		1	1	7	81	90
51	B 2340-2 x B 2337-2				5	61	66
Total		39	18	60	444	1611	2172

Twenty-eight seedlings and varieties were included in each of 2 yield tests. The plots consisted of 25 hills randomized and replicated 5 times. The tubers were graded for size above and below 2 inches in diameter. Yields of these lots are included in the report. Twenty-five tubers from each of the five replications were used to determine the specific gravity of each seedling or variety. The data for yield, specific gravity, and starch content for this test are given in Edmundson table 2.

Edmundson table 2. 1952 yield test A, Greeley, Colo.

Variety	Mean total yield per A	Mean wt. above 2 in.	Mean specific gravity	Starch
	Bu.	Pct.		Pct.
B 381-2	588	88.1	1.0903	16.18
B 904-6	543	92.7	1.0708	11.94
B 920-12	467	81.9	1.0651	10.72
B 926-9	561	91.4	1.0761	13.16
B 961-20	540	95.9	1.0827	14.41
B 962-1	442	92.3	1.0823	14.40
B 962-3	458	87.5	1.0758	12.93
Sc 6362	542	93.9	1.0658	10.73
B 962-16	539	89.2	1.0905	16.18
Katahdin	708	95.9	1.0863	15.18
Satapa	715	95.9	1.0680	11.45
Progress	519	80.2	1.0764	13.16
Triumph	661	95.5	1.0729	12.18
De Sota	585	84.8	1.0743	12.67
B 991-3	398	92.2	1.0714	12.17
B 991-13	459	93.7	1.0657	10.72
B 2067-18	531	89.6	1.0893	15.92
B 2067-97	535	86.8	1.0851	15.17
B 962-9	219	84.8	1.0940	16.95
Kennebec	693	94.1	1.0757	12.93
Kasota	420	92.1	1.0744	12.67
Waseca	485	93.6	1.0687	11.45
CS 5244	515	90.9	1.0891	15.92
CS 9741	573	91.6	1.0761	13.16
CS 10857	643	93.9	1.0681	11.45
CS 10218	441	88.4	1.0752	12.92
CS 10455	526	86.1	1.0767	13.17
CS 10454	515	90.4	1.0756	12.93
L.S.D. 5%	31	3.6	.0023	
1%	41	4.8	.0030	

Edmundson table 3 gives the data on yield, specific gravity and starch of another group of seedlings some of which are very promising. Specific gravity determinations were also made on a number of other seedlings, 4 replications of 20 tubers each were used to determine the specific gravity of each lot. These data are given in Edmundson table 4.

Edmundson table 3. 1952 yield test B, Greeley, Colo.

Variety	Mean total	Mean wt.	Mean specific	Starch
	yield per A	above 2 in.	gravity	
	Bu.	Pct.		Pct.
CS 6362	602	95.7	1.0892	15.92
N 38-42-3	619	90.7	1.0792	13.91
N 217-43-1	796	91.0	1.0788	13.65
N 311-42-1	534	87.8	1.0875	15.43
N 25-42-2	656	91.4	1.0769	13.16
N 213-43-3	429	91.4	1.0910	16.43
N 225-43-1	628	94.1	1.0783	13.65
Ia 736-42	702	95.2	1.0798	13.91
Wyo 4700	601	94.0	1.0787	13.65
Yampa	469	87.4	1.0721	12.18
CS 8381	649	97.0	1.0726	12.18
CS 8439	519	88.3	1.0857	15.17
CS 10135	554	64.9	1.0780	13.65
CS 10507	494	88.2	1.0859	15.17
Katahdin	706	95.6	1.0877	15.43
Triumph	709	95.1	1.0779	13.42
White Cloud	605	93.9	1.0719	12.17
Pontiac	864	97.2	1.0075	--
Russet Burbank	580	84.2	1.0753	12.92
N 140-42-1	803	96.5	1.0817	14.16
N 120-40-6	753	95.8	1.0883	15.66
N 209-43-1	658	94.4	1.0589	--
N 204-43-1	683	93.8	1.0913	16.43
N 213-43-2	531	89.6	1.0867	15.18
CS 10236	602	94.8	1.0900	16.18
CS 10113	341	78.7	1.0843	14.91
CS 947	512	95.2	1.0712	12.17
Pawnee	591	96.6	1.0836	14.66
L.S.D. 5%	27	3.7	.0037	
1%	36	4.9	.0049	

Edmundson table 4. 1952 seedling test, specific gravity, Greeley, Colo.

Seedling	Mean specific gravity	Starch
		Pct.
CS 11013 R	1.0902	16.18
CS 11082 R	1.0746	12.67
CS 11120 R	1.0729	12.43
CS 11154	1.0924	16.69
CS 11172	1.0915	16.43
CS 11233	1.0802	13.97
CS 11274	1.0801	13.95
CS 11290	1.0778	13.42
CS 10581	1.0717	12.17
CS 10592	1.0720	12.18
CS 10857	1.0690	11.68
CS 10854	1.0948	16.95
CS 10999 R	1.0833	14.66
CS 11002 R	1.0808	14.16
CS 11011 R	1.1012	18.49
CS 11012 R	1.0845	14.91
CS 5228	1.0719	12.18
CS 10082	1.0853	15.17
CS 10135	1.0827	14.40
CS 10220	1.0792	13.91
CS 10513	1.0815	14.17
CS 10522	1.0896	15.92
CS 10526	1.0856	15.17
CS 10585	1.0734	12.43
CS 10670	1.0768	13.16
CS 10060	1.0826	14.40
CS 10087	1.0748	12.67
CS 10213	1.0770	13.42
CS 10287	1.0738	12.44
CS 11404	1.0844	14.91
CS 11444	1.0795	13.91
CS 11504	1.0867	15.43
CS 11565	1.0890	15.92
CS 11591	1.0910	16.43
CS 11622	1.0840	14.91
CS 11626	1.0790	13.91
B 505-53	1.0661	10.95
L.S.D. 5%	.0035	
1%	.0046	

INTER-REGIONAL POTATO INTRODUCTION AND PRESERVATION STATION

R. W. Hougas, In Charge

Three phases of the Potato Introduction Project work have received primary attention during the past year: (1) the introduction of promising foreign breeding stocks, (2) the increase and distribution of stocks on hand, and (3) the evaluation of recent introductions.

Stocks have been received from 14 foreign countries during 1952. These introductions include seeds and/or tubers of commercial foreign varieties, advanced breeding selections, wild species, and species hybrids. Of particular interest are shipments received from laboratories in England, Scotland, and Germany. Some of the more promising introductions are listed in this report.

The maintenance and increase of stocks in the collection have been greatly facilitated by the completion of the physical plant. Seed and tuber increase of several introductions, difficult or impossible to obtain in the field, is now being obtained with relative ease under glass.

A very satisfactory crop increase was obtained in both the greenhouse and field in 1952. The present collection totals more than 2,100 clones and seed lots, and includes 49 species and numerous species hybrids. Seeds and tubers of the current-year's crop are now available. Shipments were made, in 1952, to 18 States and 10 foreign countries. These shipments were composed of 433 tuber lines and 421 seed lots.

The evaluation of new introductions is a large and formidable task. A thorough job of evaluation can be accomplished only through the cooperation of workers in several fields of potato investigation. This phase of the program was, due to the time required for the introduction, increase, and distribution of stocks, the last to be initiated.

Listed below, according to certain economic characters, are some of the introductions which appear promising for further research and/or breeding. The source of the information concerning these stocks is indicated.

Late Blight

Solanum demissum introductions

- | | |
|--------------|--|
| P. I. 160221 | Resistant to German strains A,B,C,D,E,F, (P. Schaper, Max Planck Institute, Germany) |
| " 160229 | " " " " " A,B,C, (" " ") |
| " 160230 | " " " A,B,C,D, & BD. Not tested with BC. (M.E. Gallegly, West Virginia) |
| " 161153 | " " German strains A,B,C,D,E,F, Seeds not homozygous, (Schaper, M. P. I. Germany) |

- | | | |
|-------|--------|---|
| P. I. | 161169 | Resistant to A,B,C,D, & BD; Not tested with BC. (Gallegly, W. Virginia) |
| " | 161175 | " |
| " | 161176 | " " German strains A,B,C, (Schaper, M. P. I., Germany) |
| " | 161180 | " |
| " | 161181 | " " A,B,C,D, & BD; Not tested with BC. (Gallegly, W. Virginia) |
| " | 161365 | " |
| " | 161366 | " |
| " | 161686 | " " five German strains (Schaper, M. P. I., Germany) |
| " | 161693 | " " German strains A,B,C, (Schaper, M. P. I., Germany) |
| " | 161729 | " " Seeds not homozygous; (Schaper, M. P. I., Germany) |
| " | 161732 | " " A,B,C,D, and BD; Not tested with BC, (Gallegly, W. Virginia) |

S. stoloniferum introductions

- | | | |
|-------|--------|--|
| P. I. | 160224 | Resistant to A,B,C,D, & BD; Not tested with BC, (Gallegly,
W. Virginia) |
| " | 160226 | " " German strains A to F; Seeds not homozygous;
(Schaper, M. P. I., Germany) |
| " | 161150 | " " " " A,B,C; Seeds not homozygous; (" " " ") |
| " | 161158 | " " A,B,C,D & BD; Not tested with BC, (Gallegly,
W. Virginia) |
| " | 161178 | " " |
| " | 161281 | " " |

S. verrucosum introductions

- | | | | |
|-------|--------|---|------------------------------|
| P. I. | 160228 | Resistant to German strains A to F; Seeds not homozygous: | (Schaper, M. P. I., Germany) |
| " | 161726 | " " " " A,B,C, | " " " " " |
| " | | | |

S. antipoviczii - *S. tuberosum* hybrids

- P. I. 188662 Resistant to common, B,C,BC & BD (W. J. Hooker, Iowa)
 " 188663 " " " " " " "flecks with BD" (Hooker, Iowa)
 " 188667 " " " " " " & BD (Hooker, Iowa)

S. demissum - S. tuberosum hybrids

- | | | | |
|--------------|----------------------|----------------------|-----------------------|
| P. I. 188627 | Resistant to common, | B,C,D, BC & BD, | (W. J. Hooker, Iowa) |
| " 188628 | " " " | B,C,BC; Susc. to BD, | (" ") |
| " 188636 | " " " | B,C,D,BC & BD | (W. J. Hooker, Iowa) |

Additional stocks of value for late blight investigations will soon be available. Several of the demissum - tuberosum hybrids used by Drs. D. Reddick, W. R. Mills, and L. C. Peterson as differential hosts for races of *P. infestans*

have been added to the collection. Dr. W. Black of Scotland has provided the station with selections carrying genes for resistance described in his recent publications. Requests have been made to other foreign laboratories for selections that may be useful as breeding stocks and/or race differentials.

Scab

Immunity to scab has been reported in certain of the Solanum species (S. caldasii, S. chacoense, S. commersonii and S. jamesii — American Potato Journal 16:71-76. Selections of S. chacoense and S. commersonii are available but their reaction to scab has not been tested. Dr. J. L. Howatt, Fredericton, N. B., Canada, has recently found a population of S. chacoense segregating for resistance to scab in the ratio 3 resistant: 1 susceptible.

Verticillium

Dr. J. G. McLean has previous^{ly} reported several varieties and selections of S. tuberosum as resistant to verticillium wilt. Populair, a Dutch variety, appears to have unusually high resistance to the disease.

X-virus

Two German introductions of S. acaule, P. I. 175395, and P. I. 175396, are reported immune to X-virus.

Y-virus

The following introductions are reported to be immune to Y-virus.

<u>S. antipoviczii</u>	P. I. 195164	Commonwealth Potato Collection, Cambridge, Eng.
<u>S. chacoense</u>	P. I.'s 175401, 175402	Max Planck Institute, Germany
<u>S. demissum</u>	P. I.'s 175404, 175411	Max Planck Institute, Germany
<u>S. gibberulosum</u>	P. I. 189215	Commonwealth Potato Collection
<u>S. saltense</u>	P. I. 189217	Commonwealth Potato Collection
<u>S. stoloniferum</u>	P. I.'s 160224, 160226, 161150, 161160, 161170, 161171, 161172, 161364	Dr. Hans Ross, Max Planck Institute, Germany
<u>S. tlaxcalense</u>	P. I. 195169	Commonwealth Potato Collection
<u>S. verrucosum</u> var. <u>spectabilis</u>	P. I. 161726	H. Ross, Max Planck Institute, Germany

Two selections of S. demissum have been reported, by Dr. G. Cockerham, of Scotland, and Dr. E. Köhler, of Germany, as good local lesion hosts for Y-virus. Another S. demissum is reported by Dr. Cockerham as a local lesion host for A-virus of potato. These demissums are currently being increased at the Potato Introduction Station.

Flea beetle

Dr. J. P. Slesman, of Ohio has found the following introductions to be highly resistant to flea beetle injury:

<u>S. caldasii</u>	(P. I. number unassigned)
<u>S. chacoense</u>	" " "
<u>S. commersonii</u>	" " "

S. demissum P. I. 161163
S. polyadenium P. I. 161728
S. stoloniferum P. I.'s 160224, 160226, 160371, 161126, 161138, 161158,
161160, 161178, 161770

Leafhopper

The following introductions have been reported, by Dr. J. P. Sleesman, of Ohio, as highly resistant to leafhoppers:

S. boergeri P. I. 133123, 133659
S. caldasii (P. I. number unassigned)
S. chacoense " " "
S. commersonii " " "
S. demissum P. I.'s 160221, 160227, 160230, 161149, 161725
S. emmae P. I. 133662
S. garciae P. I.'s 133618, 133663
S. gibberulosum P. I. 133664
S. macolae P. I. 133695
S. parodii P. I. 133708
S. polyadenium P. I. 161728
S. schickii P. I.'s 133127, 133709, 133710, 133713, 133718, 133721, 133722

Aphids (Myzus persicae)

Aphid resistance has been reported by Dr. D. Reddick, Cornell University, and Dr. Leo Dionne, Fredericton, N. B., Canada, in selections of three species. High mortality of the insect occurred when it was forced to feed, by caging, upon the following introductions:

S. demissum P. I.'s 160222 and 161367
S. stoloniferum P. I.'s 160224, 160226, 161152
S. polyadenium P. I. 161728

Colorado Potato Beetle

Outstanding resistance to the Colorado potato beetle has been found in the following stocks by Miss M. Torka of the Max Planck Institute, Germany:

S. demissum P. I.'s 161154, 161179, 161181
S. polyadenium P. I. 161728
S. stoloniferum P. I. 161281
S. chacoense - certain Max Planck Institute selections

Frost

The most frost-resistant introductions in the collections are found among S. acaule and S. demissum. Selections of both species were undamaged at 27°F. A low of 23°F. badly damaged the demissums but did not injure the acaules.

Inventory of Available Solanum Introductions

An inventory of the Solanum introductions currently available at the Potato Introduction Station has been prepared and will be distributed to technical workers interested in the breeding and improvement of the potato. Pertinent information, concerning the stocks listed, i.e., source, taxonomy, fertility, chromosome number, reaction to several diseases and insects, etc., has been summarized from the reports and publications of technical workers of this country and abroad.

Technical Committee

The Technical Committee of the Inter-Regional Potato Introduction and Preservation Project held their annual meeting at Sturgeon Bay, Wis., August 14 and 15, 1952. The Committee reviewed the work under way at the Station, formulated plans for further work, discussed the annual reports of progress, and prepared an annual budget. Recommendations were made to the proper state and federal administrators on matters of policy and budget.

The members of the Technical Committee are:

Federal Representatives

F. J. Stevenson, Division of Vegetable Crops & Diseases, BPISAE, USDA
W. H. Hodge, Division of Plant Exploration & Introduction, BPISAE, USDA

Regional Representatives from Experiment Station Regions

F. D. Cochran, North Carolina State Agricultural Experiment Station, Representative of Southern Region
F. A. Krantz, Minnesota Agricultural Experiment Station, Representative of North-Central Region
W. R. Mills, ¹/Pennsylvania State Agricultural Experiment Station, Representative of Northeastern Region
C. L. Vincent, Washington State Agricultural Experiment Station, Representative of Western Region
R. W. Hougas, Division of Plant Exploration & Introduction, BPISAE, USDA & Wisconsin Agricultural Experiment Station, Project Leader, Inter-Regional Potato Introduction & Preservation Station, Sturgeon Bay

The administrative adviser for the Project is:

Dean W. V. Lambert, Nebraska Agricultural Experiment Station

¹/Dr. L. C. Peterson of Cornell University served as alternate in the absence of Dr. Mills during the August 1952 meeting of the Technical Committee

PACIFIC NORTHWEST
John G. McLean

Variety Trials

In the early variety trials at Parma and Lewiston, the varieties De Soto, White Rose, and Kennebec produced the greatest yield (McLean tables 1 and 2). Due to the heavy soil at Parma, the percentage of No. 1 tubers was very low. When the U.S. 1 and U.S. 2 grades were added together, the range of marketable tubers was found to be between 51% and 82%. Both Kennebec and Menominee produced tubers that averaged 18% starch at Lewiston as compared with 17% for Russet Burbank.

In the *Verticillium* wilt trials at Rexburg, Idaho, results were obtained similar to those reported in 1950. There was a significant negative correlation between yield and disease index. The correlation of variety means gave a value of -0.889 while a correlation of individual readings for each replication gave a figure of -0.669. The correlation of yield and index on the non-replicated, five-hill seedling trials gave a value of -0.444. All correlations were highly significant. This again indicated that *Verticillium* is a limiting factor in potato production in this area.

In a variety trial conducted by the 4-H Club at Idaho Falls, the Colorado Seedling C.S. 6330 cracked severely. The great number of shallow cracks on the surface resulted in no marketable tubers being produced. This seedling has previously been considered to be outstanding in this area because of resistance to scab and *Verticillium* and the yield of U.S. No. 1, high-quality tubers.

McLean table 1. Yield and quality of 9 varieties at Lewiston.^{1/}
Woodbury and McLean.

Variety	Yield	U.S. No. 1		Specific ^{2/} gravity	Starch
	Sx/A.	Sx/A.	Pct.		Pct.
De Soto	439.4	391.7	89.1	1.0864	15.4
White Rose	425.9	382.8	89.9	1.0966	17.5
Kennebec	363.1	336.2	92.6	1.0998	18.0
Chippewa	358.5	317.5	88.6	1.0813	14.2
Menominee	335.4	312.3	93.1	1.1005	18.2
Red Warba	318.0	276.0	86.8	1.0932	16.7
Russet Burbank	294.7	256.3	87.0	1.0944	17.0
Triumph	257.0	189.9	73.9	1.0941	16.9
B 515-2	205.4	183.6	89.4	1.0811	14.2
B 515-2 ^{3/}	182.1	152.5	83.8	1.0863	15.3
L.S.D. 19:1	61.25	18.67			
99:1	82.75	25.31			

^{1/} Average of 4 replications. ^{2/} Average of 20 individual tubers.

^{3/} Planted 2 weeks later.

McLean table 2. Yield and marketable tubers from 11 varieties at Parma.^{1/}
Franklin and McLean

Variety	Yield	U. S. No. 1		Marketable
		U.S. No. 1 & No. 2		
	Sx/A.	Sx/A.	Pct.	Pct.
De Soto	298.5	143.2	48.0	75.2
Kennebec	285.5	96.7	33.9	73.2
White Rose	282.9	80.4	28.4	80.5
Menominee	227.1	78.4	34.5	81.2
Russet Burbank	222.2	69.1	31.1	72.5
1276-185	210.5	103.9	49.4	75.8
Ia 8186-25	186.7	92.1	49.3	73.6
Red Warba	183.2	49.9	27.2	51.3
B 579-3	162.6	96.7	59.5	82.0
B 515-2	158.8	51.1	32.2	71.2
Triumph	147.2	75.8	51.5	72.9
L.S.D. 19:1	26.5	27.6		8.2

^{1/} Average of 5 replications.

No significant differences were found in specific gravity.

Verticillium Wilt

Resistance to Verticillium wilt is difficult to determine since it is a disease of senescence. The use of a disease index and average index gives a satisfactory measure of the effect of disease on yield (McLean table 3). Early maturing plants, however, automatically receive a high average index reading while late-maturing plants may escape the disease rather than being resistant. Plants that set tubers late in the season or over a long period are generally more resistant than those that set tubers early. Stoloniiferous plants are generally resistant.

McLean table 4 shows the distribution of seedlings in 6 family lines at Aberdeen. In the crosses 528-170 x 606-3, 792-88 x 522-33, and Mohawk x Menominee, early type plants were found with low index readings. In the distribution of seedlings from Menominee selfed, susceptible seedlings can be determined but any resistance in the late seedlings cannot be separated from the escape due to lateness.

A Verticillium-resistant, russet selection, A101-17, has been found in the cross of Russet Burbank x Menominee. The continued growth and ^{high} yield of this long type potato resulted in second growth to the extent that no No. 1 tubers were produced, although it yielded at the rate of 4 pounds per hill at Rexburg.

McLean table 3. Yield, verticillium wilt, and quality of 12 varieties at Rexburg.^{1/} McLean.

Variety	Yield	Verticillium index	U.S. No.1	Specific gravity	Starch
	Sx/A		Pct.		Pct.
Sequoia	401.6	3.2	94.0	1.0817	14.3
A.C. 25669	386.2	12.6	79.4	1.0757	13.0
Furore	356.3	10.7	70.0	1.0930	16.7
Menominee	342.1	8.5	89.2	1.0994	18.0
41956	331.1	10.6	65.8	1.0904	16.1
Craigs Bounty	324.7	6.8	91.0	1.0873	15.4
A.C. 25671	273.0	38.4	87.4	1.0755	13.0
Empire	269.8	12.5	96.4	1.0830	14.5
Cayuga	262.5	21.9	65.6	1.0848	15.0
Mohawk	238.7	27.9	90.0	1.0818	14.3
Russet Burbank	183.8	63.8	49.8	1.0739	12.5
Red Warba	140.7	88.3	35.0	1.0730	12.4
L.S.D. 19:1	92.8	23.4	20.5	.0091	
99:1	123.3	31.2	27.5	.0121	

^{1/} Average of 5 replications.

Leaf Roll

In a leaf roll resistance test at Parma, Idaho, only 3 out of 100 lots were without symptoms. These were B 579-3, received from Dr. Menzies, and B 2963-4 and B 2963-7, from Aberdeen. Twelve lines showed only slight symptoms, which were comparable to those seen on Aquila and 1276-185. These have been saved for replanting in 1953. This trial was initiated to screen out the susceptible material before testing by Dr. Menzies at Prosser, Wash. The presence of aphids throughout the season, however, resulted in a uniform and severe spread of leaf roll.

Scab

Because of the uniform infestation of scab in the soil at Aberdeen the breeding plots can be used for a scab trial, and different years can be used as replications on the selections. In 1952, 28% of the selections showed no scab, 20% produced type 1 to type 3 lesions, and the remainder were unmarketable because of scab. Most of the badly scabbed tubers were from lines that were bred for leaf roll or verticillium resistance and had no scab resistance in the parents.

McLean table 4. Distribution of seedling progeny by maturity and verticillium index at Aberdeen.

Maturity Class	VE	E	ME	M	ML	L	VL	VVL
Average Index	65.4	45.7	35.3	32.4	26.4	17.9	10.1	8.0
Parents								
528-170 x 606-3	M, ML, ME,	M, ME, ML,		L, M, L,	<u>VE</u> , ML,	L, M, M, M, L, <u>ML</u> , <u>ME</u> , M, M,	VL, L, L, L, L, VL,	L, L, <u>E</u> , L, <u>ML</u> ,
792-88 x 522-33	L, L, VE, ML,	L,	ME, ML	L,	ML, E, VL, L, ML,	ML, <u>ME</u> , M, ML VL, ML, L, ML,		VL, VL, VL, VL, VL, VL, VL, VL, VVL,
595-76 x Menominee	E,		L,		M, L,		VL,	VL, <u>ML</u> , <u>ML</u> , VL,
Menominee self		E, ML, VL,	VL, L, L,	M, VL,	ML, ML, L, M, VL, VL, VL, VL,	VL, L, VL, VL, VL, VL,	VVL, VL, VL, VL,	VL, VVL
Mohawk x Menominee	E,	ML, M ML, ML, VE,	L, ML ML,	ME, ML, ML,	<u>VE</u> , M, ML, L,	ML, VL, M, ML, VL, VL,	L, <u>ML</u> , VL, L, VL, VL, VL,	VL, VL, L, <u>ML</u> , L, <u>ME</u> ,
Essex x Menominee	ML, ML, ML, E, ME, E, ME,	M, ML,		ME,	L, ML, ML,	VL, L, L,	VL, L,	VL, VL, L,

Breeding

By using plants girdled with wire and growing cut-flower stalks in dilute nutrient solution (American Potato Journal 29: 206-211. 1952) it was possible to get crosses on plants that were considered non-fertile in the field. Russet Burbank was used as a female parent and B 515-2 could be used as a male parent both in selfing and crossing. Crosses were readily made onto B 579-3, B 137-5, Saranac, Russet Sebago, and others that had previously been difficult to cross.

Specific Gravity

In 400 selections from the 1952 crops, 30% had a specific gravity over 1.090 or approximately 16% starch. Of these, 12.5% were between 16% and 18%, with 4.1% producing 20% to 22% starch. Only one line approached 24% starch content.

NORTH CENTRAL REGIONAL POTATO TRIALS 1952

C. E. Peterson and Cooperators

(See North Central table 1)

The cooperative potato-testing program for the North Central region initiated in 1951 was continued in 1952. Indiana and Kansas were added in 1952 making a total of 8 States participating. The general plan outlined in 1951 was followed again in 1952 with some minor modifications. There were 18 numbered selections and Cherokee entered, along with the 3 check varieties, Cobbler, Triumph and Katahdin. North Central table 1 lists pertinent general data on plots at each location.

Reports on the replicated trials were received from all locations, and the data were forwarded to E. J. Koch, Biometrician in the Bureau of Plant Industry, at Beltsville, for analysis^{1/}. Data on yields of U.S. No. 1 potatoes and specific gravity were analyzed and the results are recorded in North Central table 2. Tests revealed that variances in both yield and specific gravity were not homogeneous so that it was not advisable to pool the data and run combined analyses.

It will be noted in North Central table 2 that the overall mean yields are recorded for varieties at 7 locations. These means cannot be interpreted statistically but they might provide an indication of adaptability. A high mean yield for all locations indicates wide adaptability and the locations or conditions under which such a variety is not adapted may be determined by studying its performance at each location. From the wide range of environmental and cultural practices represented in these trials (see North Central table 1) it would be surprising to find a selection well adapted at all locations. By providing such diverse environments these trials should reveal weaknesses or valuable characters that might not become evident in years of testing at one location.

At Grand Forks, N. Dak., none of the entries exceeded the yields of Cobbler or Triumph by a significant margin. Two entries, Min. 15.46-20-48 and ND 457 exceeded Katahdin at very near significant margins. ND B 515-2 yielded significantly below Cobbler and developed 16% growth cracks. On the basis of external tuber appearance the best lots in the North Dakota trial were ND 457, a white selection, and two reds, ND (Picha)45.11-101 and Wisc. 1301. The latter selection, however, yielded significantly below that of Cobbler and Triumph. Also high on the list on the basis of external tuber appearance were Min. 15.46-20-48, which was among the top yielders, and Neb. 89.46-2, a highly colored red which yielded significantly below Cobbler and Triumph. Entry 21 (6316) is of interest because it has been receiving some attention in commercial plantings. In the Grand Forks trials 6316 produced a yield not significantly below Cobbler. Starch and percentage U.S. No. 1 were virtually the same as that of Cobbler but it developed 10% hollow heart.

^{1/} The very excellent and prompt service of Mr. Koch in completing the statistical analysis is gratefully acknowledged.

North Central table 1. North Central regional potato trials, 1952.

	North Dakota	Minnesota
Cooperator	J. H. Schultz	F. A. Krantz
Location	Grand Forks	Duluth
Soil Type	Bearden Clay Loam	Clay Loam
Fertilizer	300#/A, 0-30-15	100#/A, 0-20-20
Spacing	40" x 18"	36" x 18"
Date Planted	May 9	May
Date Harvested	Sept. 17	Sept. 12
Remarks	Dry to June 25, Good moisture after that date Some hail damage 7/10. No serious disease problem	Wet to Aug. 10. Dry Aug. 25 to Sept. 12. No blight on foliage. Water damage in Block IV.
	Wisconsin	Michigan
Cooperator	G. H. Rieman	E. J. Wheeler
Location	Antigo	
Soil Type	Antigo Silt Loam	Sandy Loam
Fertilizer	1000#/A, 6-6-18 broadcast 800#/A, 3-12-12	700#/A, 3-12-12
Spacing	36" x 12"	36" x 12"
Date Planted	May 9	May 8
Date Harvested	Sept. 5	Oct. 10
Remarks	Wet to late August. No rain after Sept. 1. Some water damage. No late blight. Plenty of growth cracks.	Dry until late June. Wet in July & early August. Low rainfall in Aug., Sept., Oct. Irrigated during Aug. and Sept.
	Indiana	Iowa
Cooperator	N. K. Ellis	C. E. Peterson
Location	North Judson	Clear Lake
Soil Type	Muck	Muck
Fertilizer	1400#/A, 3-9-18	700#/A, 0-9-27
Spacing	36" x 12"	36" x 12"
Date Planted	May 12	May 7
Date Harvested	Oct. 14	Sept. 23
Remarks	Normal rain to Sept. then dry. Much growth cracks. Second growth & hollow heart. No serious disease problem.	Good moisture to Sept 1. No rain in Sept. Much hollow heart, growth cracks & internal necrosis. No serious disease injury.

North Central table 1 continued

	Nebraska	Kansas
Cooperator	H. O. Werner	Elmo W. Davis
Location	Scottsbluff	Manhattan
Soil Type	Tripp very fine, sandy loam	Deep silt loam
Fertilizer	None, (followed alfalfa)	300#/A, 10-20-0
Spacing	36" x 12"	36" x 12"
Date Planted	June 14	March 17
Remarks	Weekly irrigation 7/10- 9/10. Season warmer & drier than normal. No serious disease develop- ment.	Sprinkler irrigation as needed. No serious disease problem.
Date harvested	October 15	July 24

Entry 19, Wisc. 303-40, was the only one yielding significantly higher than Katahdin in the plots at Duluth, Minn. In addition to Wisc. 303-40 the following 5 entries produced significantly higher yields than Cobbler: N.D. (Picha) 45.11-101, Wisc. M804, ND B 515-2, Wisc. K5, and Cherokee. ND (Picha) 45.11-101 had 20% hollow heart and ND B 515-2 produced 16% growth cracks. No serious defects were observed in the other high-yielding selections but Cherokee tubers were rough in all replications. On general appearance Wisc. M804 was rated among the best in the Duluth plots. Wisc. 303-40 was also given a fairly high general rating. In North Central table 3 it will be noted that both are later than Katahdin and both have some scab resistance, although in the Minnesota scab plots at Grand Rapids a trace of No. 5 type scab was observed in Wisc. 303-40.

Only two entries, Cherokee and Min. 113.43-8-45, exceeded Katahdin in yield at Antigo, Wis., and these differences were not great enough to be significant. Cherokee again produced rough tubers in these trials. ND B 515-2 developed 12% growth cracks but the yield of U.S. No. 1 tubers was very close to that of Katahdin. It matured much earlier than Katahdin and it was scab resistant in the Antigo scab plots (North Central table 3). Two red selections ND (Picha) 45.11-101 and Neb. 20.42-9, produced yields not significantly below that of Katahdin. Neb. 20.42-9 produced rough tubers with 8% growth cracks. No serious defects were noted in ND (Picha) 45.11-101.

In the Michigan trials only entry No. 12, (ND (Picha) 45.11-101), produced a yield significantly higher than that of the Katahdin check. No serious defects were noted in any of the entries as evidenced by the high percentage of U.S. No 1 potatoes (North Central table 2). The red selection Neb.20.42-9 was among the high yielders here as it was in Wisconsin. The yield of ND B 515-2 was very near that of Katahdin.

Principally because of scab and growth cracks the yields of U.S. No. 1 tubers from Cobbler and Triumph were very low in the test at North Judson, Ind.

Compared with the Katahdin yield of 465 bushels per acre there were two outstanding selections. Wisc. 303-40 produced at the rate of 693 bushels of U.S. No. 1 potatoes per acre and N.D. (Picha) 45.11-101 produced 656 bushels. The third variety, Mich. 1363, yielded 562 bushels, which was significantly more than that of Katahdin. Note the very low percentage of U.S. No. 1 potatoes, (North Central table 2) in the Indiana trial. Many of the grade defects were due to severe scab. Cherokee produced 25% growth cracks and 25% second growth. ND B 515-2 produced 30% growth cracks and 10% second growth.

At Clear Lake, Iowa, two red selections, ND (Picha) 45.11-101 and Ia X 26-8 produced yields significantly higher than Cobbler. ND (Picha) 45.11-101 produced 5% hollow heart and 9% undersize. The most serious defect in Ia. X 26-8 was its rather heavy set and resulting 15% undersize. Wisc. 303-40 was also a high producer here as it was in Indiana. Its greatest disadvantage seems to be extreme lateness (see North Central table 3). In the Iowa trial there was a high incidence of growth cracks, hollow heart, and internal physiological necrosis. Defects due to growth cracks totaled 33% for ND B 515-2, 25% for Mich. B 505-3, and 10-14% for ND 457, Katahdin, and Neb. 20.42-9. The entries most severely affected with hollow heart were ND 457, 30%; Min. 15.46-20-48, 25%; Cobbler, 25%; Ia. 6316 and Katahdin each, 17%. Internal physiological necrosis occurred in Wisc. M804, 55%; ND 457, 32%; and Mich. 46-9, 23%. Most other entries were relatively free of this defect. Internal necrosis index values based on severity, as well as number of tubers affected, were computed. These values, together with data on the other defects, are recorded in Iowa table 4.

The variety Progress, which was added to the other entries in the Nebraska trial, was the outstanding potato tested at Scottsbluff. Progress yielded at the rate of 523 bushels per acre and 80% of U.S. No. 1 potatoes compared with 386 bushels and 56% for Triumph. Only two entries in this test, ND (Picha) 45.11-101 and Ia. X 26-8, were not significantly below Triumph in yield. Growth cracks were a serious defect in Neb. 20.42-9, ND B 515-2, Mich. B 505-3, and Cherokee.

In the Kansas trial all the entries were not included. Cobbler far outyielded any other entry at Manhattan. Wis. K5 was the closest contender but it was still significantly below Cobbler.

In North Central table 2 are given the mean starch percentages from all the trials. These were determined from specific gravity gradings. Differences in response of varieties at different locations are evident in table 2. At some places Katahdin was higher than Cobbler and at some it was lower, and when averaged for all locations the two happened to come out with the same starch percentage. ND B 515-2 and Neb. 20.44-2 were among the entries low in starch.

North Central table 3 summarizes notes on maturity and scab readings. Where a good scab test could not be obtained in the replicated plots a separate planting was made in special scab plots.

Following the procedure established in 1951 each cooperator prepared extra copies of complete data and field notes for all the States participating. These notes include more complete estimates of grade defects and other details not included here so that each cooperator will have material for carefully evaluating the entries in which he is especially interested.

North Central table 2. Yield and percentage of U.S. No. 1 tubers and starch content of entries in N.C. regional trials, 1952.

Ent- ry	Variety or selection No.	North Dakota			Minnesota			Wisconsin		
		Yield per acre		Starch	Yield per acre		Starch	Yield per acre		Starch
		U.S. No. 1			U.S. No. 1			U.S. No. 1		
No.		Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.
1	Cobbler	228	98	14.7	120	75	14.7	468	95	14.7
2	Triumph	219	96	13.2	142	74	11.7	356	93	14.7
3	Katahdin	177	90	15.1	155	88	14.9	474	97	15.6
4	Min. 15.46-20-48	243	99	16.0	163	82	18.1	378	95	16.0
5	Min. 113.43-8-45	171	98	12.6	114	78	12.1	484	95	13.2
6	Neb. 20.42-9	106	64	14.3	147	77	12.8	449	96	13.9
7	Neb. 59.41-P1	192	89	15.6	--	--	--	145	78	---
8	Neb. 89.46-2	118	92	13.4	84	69	13.0	288	96	14.9
9	Neb. 20.44-2	128	88	11.9	85	62	9.8	344	92	12.8
10	N.D. 457	242	97	16.4	120	70	15.4	362	95	15.8
11	N.D. B 515-2	160	85	11.9	194	87	11.5	467	96	13.6
12	N.D.(Picha) 45.11-101	203	95	14.1	198	85	13.4	451	95	15.1
13	Mich. 46-9	131	89	13.4	163	86	14.3	395	94	15.8
14	Mich. B 505-3	91	77	11.9	127	65	11.3	378	94	12.8
15	Mich. 1363	--	--	---	122	77	13.0	424	96	12.8
16	Wisc. M804	189	94	15.4	195	81	15.8	420	93	17.9
17	Wisc. 1301	152	94	14.5	116	71	13.0	366	94	13.9
18	Wisc. K5	--	--	---	176	74	12.4	445	94	13.4
19	Wisc. 303-40	197	95	14.7	209	77	14.7	436	94	15.8
20	Ia. Cherokee	218	98	15.8	169	77	15.8	498	95	17.1
21	Ia. 6316	218	97	15.4	162	87	15.6	256	95	16.0
22	Ia. x 26-8	238	93	13.9	77	46	14.5	338	86	16.0
23	Neb. Progress									
	Mean	182		14.5	144		13.9	392		14.7.
	L.S.D. .05	66		1.5	46		0.9	72		0.7
	.01	88		2.0	61		1.2	96		1.0
				Michigan		Indiana		Iowa		
1	Cobbler	515	95	11.7	146	20		508	76	12.6
2	Triumph	--	--	--	70	10		281	67	11.3
3	Katahdin	562	98	11.5	465	60		496	74	11.3
4	Min.15.46-20-48	453	97	11.7	291	50		525	68	12.8
5	Min.113.43-45	515	98	8.9	285	50		401	91	9.8
6	Neb. 20.42-9	583	99	10.4	318	50		397	77	12.1
7	Neb. 59.41-P1	343	91	12.1	343	50		336	71	13.4
8	Neb. 89.46-2	410	98	8.5	164	90		220	92	11.9
9	Neb. 20.44-2	464	96	8.3	151	30		421	85	10.4
10	N.D. 457	450	95	11.3	328	60		550	82	13.2
11	N.D. B 515-2	559	96	10.2	358	55		239	62	9.8
12	N.D. (Picha) 45.11-101	660	98	10.0	656	85		658	89	11.5
13	Mich. 46-9	430	92	10.4	363	70		466	84	12.4
14	Mich. B 505-3	554	97	9.4	413	70		510	67	10.9

North Central table 2 continued.

Entry No.	Variety or selection No.	Michigan			Indiana		Iowa		
		Yield per acre			Yield per acre		Yield per acre		
		U.S. No. 1	Starch		U.S. No. 1		U.S. No. 1	Starch	
		Bu.	Pct.	Pct.	Bu.	Pct.	Bu.	Pct.	Pct.
15	Mich. 1363	525	97	10.2	562	70	578	89	11.3
16	Wisc. M804	515	95	12.8	316	50	460	90	12.8
17	Wisc. 1301	--	--	---	290	50	389	81	13.2
18	Wisc. K5	--	--	---	311	40	597	79	10.9
19	Wisc. 303-40	546	97	11.7	693	85	598	85	12.8
20	Ia. Cherokee	510	98	15.1	325	50	547	87	13.2
21	Ia. 6316	383	96	11.7	244	80	597	94	13.6
22	Ia. x 26-8	559	95	11.9	486	75	658	82	12.6
23	Neb. Progress								
	Mean	501		10.9	345		474		11.9
	L.S.D. .05	88		1.7	83		107		0.7
	.01	117		2.3	110		141		1.0
Nebraska				Kansas		Means for all tests			
						1/		2/	
1	Cobbler	344	61	14.5	212	75	358		13.9
2	Triumph	386	56	12.1	--	--	--		---
3	Katahdin	274	52	15.4			393		13.9
4	Min. 15.46-20-48	151	65	15.8			343		15.1
5	Min. 113.43-8-45	148	51	13.6			322		11.7
6	Neb. 20.42-9	219	46	14.7	99	56	331		13.0
7	Neb. 59.41-P1	---	--	---	51	34	---		---
8	Neb. 89.46-2	245	74	13.9	80	73	232		12.6
9	Neb. 20.44-2	266	62	12.4	111	54	280		10.9
10	N.D. 457	279	67	16.6			359		14.7
11	N.D. B 515-2	161	36	11.9			326		11.5
12	N.D. (Picha)	372	75	14.7			482		13.2
	45.11-101								
13	Mich. 46-9	244	67	14.5			330		13.4
14	Mich. B 505-3	14	6	13.0			298		11.5
15	Mich. 1363	285	57	13.6			---		---
16	Wisc. M804	211	75	16.9	51	51	353		15.1
17	Wisc. 1301	281	67	15.4	75	52	---		---
18	Wisc. K5	--	--	--	160	65	---		---
19	Wisc. 303-40	220	77	15.8	24	37	439		14.3
20	Ia. Cherokee	173	58	12.1	112	64	374		14.7
21	Ia. 6316	196	54	16.0	110	64	319		14.7
22	Ia. x 26-8	324	75	14.9	71	45	408		14.1
23	Neb. Progress	523	80	13.9					
	Mean	253		14.5	96				
	L.S.D. .05	65		1.6	42				
	.01	87		2.2	56				

1/ Average of 7 locations. Kansas data not included.

2/ Average for 6 locations.

North Central table 3. Maturity and scab notes on entries in N.C. regional trials, 1952.

Entry:	Variety or	Maturity Notes 1/				Scab Readings 2/						
No.:	Selection No.	N.D.:	Min.:	Wisc.:	Mich.:	Ia.:	Kan.:	N.D.:	Min.:	Wisc.:	Ia.:	Neb.
1	Cobbler	2.0	2.2	2.0	2.0	1.6	2.0	1-2	4-5		2-3	3-1
2	Triumph	2.0	2.1	2.2		1.6		1-2			2-3	3-1
3	Katahdin	4.0	4.5	4.5	4.6	3.8		1-2			1-3	2-3
4	Min. 15.46-20-48	3.7	3.1	3.5	4.4	2.8		1-1	2-4		1-4	1-2
5	Min. 113.43-8-45	3.5	3.0	2.5	2.4	1.4		N3/	T-1		1-2	1-1
6	Neb. 20-42-9	2.0	2.0	2.2	2.2	1.6	3.0	1-2	1-1	2-3	1-3	1-2
7	Neb. 59.41-P1	3.5	--	2.5	4.6	2.2	2.5	1-1	-	1-1	2-1	-
8	Neb. 89.46-2	2.5	2.6	5.0	3.2	2.2	2.0	1-1	1-2	2-3	1-2	1-2
9	Neb. 20.44-2	1.5	2.2	2.5	2.0	2.0	2.0	1-2	2-5	2-4	1-3	1-3
10	N.D. 457	3.2	2.3	2.2	4.8	2.6		1-2	3-4	3-2	1-2	1-2
11	N.D. B 515-2	2.0	1.8	2.0	2.2	1.2		1-1	1-2	1-2	T-1	-
12	N.D.(Picha)45.11-101	4.0	4.0	3.5	5.0	3.2		1-1	2-2	3-2	1-2	1-2
13	Mich. 46-9	5.0	3.8	5.0	5.0	3.8		1-2	1-2	2-2	1-2	1-1
14	Mich. B 505-3	3.7	4.0	5.0	4.2	3.6		1-1	1-2	1-1	2-2	3-1
15	Mich. 1363	--	2.5	2.0	2.0	1.6		--	T-3	1-2	1-2	1-2
16	Wisc. M804	4.5	4.9	4.5	5.0	4.2	2.5	1-1	T-2	1-1	1-1	1-1
17	Wisc. 1301	3.0	3.1	2.2	-	2.8	1.0	1-3	3-5	2-3	2-3	1-4
18	Wisc. 1K5	--	3.0	3.5	-	2.6	3.7	--	3-5	3-3	2-4	--
19	Wisc. 303-40	4.2	4.8	4.5	4.8	4.4	2.2	1-2	T-5	2-2	2-2	1-1
20	Ia. Cherokee	3.7	3.8	3.5	4.2	2.4	1.7	N	2-3	3-2	1-1	--
21	Ia. 6316	3.5	3.9	3.2	4.4	1.4	4.0	N	3-3	3-2	T-1	1-1
22	Ia. x 26-8	2.7	2.1	4.5	4.2	3.2	3.2	1-1	1-3	1-1	1-1	1-2
23	Neb. Progress											1-1

1/ Average of at least 4 readings - 1 = earlier than Cobbler, 2 = Cobbler maturity, 3 = later than Cobbler but earlier than Katahdin, 4 = Katahdin maturity, 5 = later than Katahdin.

2/ First figure indicates area, T = trace, 1 = 1-20% of surface covered, 2 = 21-40%, 3 = 40-60%

Second figure indicates type of scab lesion, 1 = surface (russet) type, 2 = raised surface or shallow pit, 3 = pitted scab, 4 = deep pits.

3/ N = None.

COLORADO (Ft. Collins)
Lawrence A. Schaal (U.S.D.A.)

Nature of Scab Resistance

Relative to the studies on the common scab disease of potatoes, the work on the nature of physiologic resistance was continued in cooperation with the Colorado Agricultural Experiment Station. Data obtained show further proof that resistant varieties contain more chlorogenic acid in the cells near the lenticels and in the cell layers immediately below the surface of the tuber. Further evidence obtained indicates that chlorogenic acid may act directly to retard growth of the fungus by lowering the pH of the cells to a point unfavorable for growth of the organism. Also, that there is a development of a layer of cork cells under the invading organism stimulated to rapid growth by the action of tyrosinase on the chlorogenic acid producing a quinone that apparently functions as the stimulating factor. Studies made on tubers from 85 seedling varieties indicated that very small tubers of resistant varieties contain high amounts of chlorogenic acid; perhaps more than after tubers are larger. The sprouts of resistant varieties appear to be high in chlorogenic acid.

Experiments with chlorogenic acid and related phenolic compounds, showed that when the injured or cut surface of a potato tuber is treated with a low concentration of the chemical production of suberized tissue is greatly accelerated. As much protective layer is produced in 48 hours as is produced on untreated cut surface in 10 days. The surface is made much tougher and does not break in handling. These materials may serve as effective seed treatments since the quinone produced in the process is also toxic to fungi and bacteria. Field experiments with catechol treated lots gave no significant data since conditions for natural suberization last season were very favorable and no rot occurred in the check.

Chemical Control of Scab

Further tests with Chemical No. 162 were conducted in the San Luis Valley area on scab control. When No. 162 was added to the soil by a mechanical applicator, two weeks before and immediately before planting at 20 to 40 and 60 pounds per acre rates, scab infection was reduced. For the heavier applications applied just prior to planting severe phytotoxic action was noted. The method of application was not completely satisfactory and it was concluded that if No. 162 was added to the opened row in the form of a spray, then followed by planting, the chemical will effectively reduce scab at the 40-pound-per-acre rate. The method of application needs more study.

Studies on Color Intensification and Sprout Inhibition

Further studies were made on the intensification of the red color of Red McClure potatoes combined with the sprout inhibiting effect of maleic hydrazide (MH.30) methods and time and amounts of application were studied at Monte Vista, Colo. The intensification of the color was again observed, but sprout inhibition data will not be available until a later date. Data

from 1951 experiments with MH.30 showed that it prevented sprouting completely as late as September 1952. The tubers appeared firm and still marketable. Studies were made of rates and dates of application, and on combining it with 2,4-D. These data are not available on this date.

By Lawrence A. Schaal (U.S.D.A.) and
Cecil W. Frutchey (Colo. Agr. Expt. Sta.)

testing
The cooperative potato-breeding / program for the Colorado area was continued on an expanded basis during the 1952 season. All crosses were made by W. C. Edmundson at the Greeley Station, who also grew and selected all 1-year tubers. The 5-hill selections were again grown at Greeley, and selections from the 1951-5-hill lots were grown in 10-hill lots in 2 selected scabby soils at Gilcrest, Colo. and at Del Norte, Colo.

Large lots of seedling material were grown in test plots located at the San Luis Valley Demonstration farm, Gilcrest, Colo., Eaton, Colo., Ault, Colo., and Fort Collins, Colo. A large amount of these test plots was given to the testing of commercial value of the several seedlings, most of which were red varieties originally obtained from H. O. Werner. Several of the USDA seedlings were also included in these test plots.

Gilcrest, Colorado, Scab Test Plot. 1952

This test plot was utilized to obtain information regarding the scab-resistance of 85 selected seedlings in a very scabby soil. Ten hills of each seedling were planted with a check hill of Bliss Triumph in each lot. A good scab reading was obtained on all 85 seedlings and also some information on adaptability was noted. Samples of each variety were collected and will be utilized in determining races of *Streptomyces* present and also in checking the newly developed ferric chloride test for chlorogenic acid and scab resistance. Schaal table 1 lists the seedlings that showed some promise, and will be kept for further testing.

A large number of these seedling selections showed medium to high scab resistance but were considered undesirable because of rough or growth-cracked tubers. The Bliss Triumph hill in each lot was heavily scabbed indicating a uniform infection of the soil.

Del Norte, Colorado, Scab Test Plot. 1952.

This plot was located in a very scabby soil in the Rio Grande Valley. In this particular area scab is a limiting factor for potato growing. Red McClure, the commercial variety grown here, was not marketable as a U.S. No. 1 potato because of scab. The same 85 seedling selections grown at Gilcrest, Colo., were grown here. Several red selections appeared to produce a better type and yield of tubers than did the Red McClure checks. These are listed in Schaal table 1. There was considerable variability in the susceptibility of several lots to the physiologic races of *Streptomyces scabies* present in these two soils. This difference did not vary from deep No. 4 type pustule to the shallow No. 1 type, but the variation was between a No. 2 type and No. 4 pustule. In all cases when high resistance was exhibited by a given variety

at one location, it was observed to be highly resistant at the other, indicating highly resistant varieties are resistant to all races of the scab organism.

Schaal table 1. Seedlings appearing to have promise at Del Norte, Colo. and at Gilcrest, Colo., 1952.

Seedling No.	Tuber color	Del Norte Colo.	Gilcrest Colo.
CS 11404	Russet	+	+
CS 11154	White	-	+
CS 11626	White	-	+
CS 11637	White	+	+
CS 11080	Red	+	+
CS 11016	Red	-	+
CS 11672	White	-	+
CS 11358	Red	+	-
CS 11491	White	+	-
CS 11172	White	+	-
CS 11293	White	+	+
CS 11636	White	+	-
CS 11504	White	+	-
CS 11600	White	+	-
CS 11085	Red	+	-
CS 10917	White	+	-
CS 11342	White	+	-
CS 11197	White	+	+
CS 10999	Red	+	-
CS 10082	Red	+	-
CS 11008	Red	+	-

+ = Scab-resistant and horticulturally desirable.

- = Not scab-resistant and/or not horticulturally desirable.

The Adaptability and Increase Plots. 1952.

These cooperative test plots were designed to test on a more extensive basis the several seedling selections and certain named varieties grown in the several test plots last season (1951). Sufficient seed was on hand to permit testing these selections that showed some promise in several places. Fourteen selections and two named varieties were grown at Gilcrest, Colo. planted in April as an early crop, at Fort Collins, Colo., planted in May as a late crop, at Ault, Colo., as a late crop, and at Eaton, Colo., as a late crop.

Schaal table 1 shows the results of growing these selections in the Gilcrest, Colo., test. Disease observations were made several times during the growing season and also at harvesttime. Schaal table 1 summarizes these observations and readings.

The named variety White Cloud produced a high yield of good-shaped tubers, and was as good as Cobbler or better. Several red tuber varieties appeared to have promise but all were quite susceptible to scab.

Eaton, Colorado, Test Plot. 1952

This plot consisted of seedling selections that had shown promise in tests previously and included several of the Nebraska selections from H. O. Werner. This test was planted in soil typical of that commonly found in northern Colorado, and more especially that of the Greeley district.

Thirty-two selections were planted and 17 were rogued out before maturity because of high amount of virus diseases. CS 6362 did not produce a marketable crop here. CS 10854, CS 10087, CS 9947, CS 10236, and B 73-10 appeared to have possibilities in this soil. One seedling, CS 10513, was outstanding. It is the product of a cross, Yampa x President, and appeared superior to all others in this test. CS 10592, a seedling selection with a desirable red color and with some promise in other sections of Colorado, did not appear desirable here.

Ault, Colorado Test Plot. 1952

This plot was planted in an isolated area with the production of disease-free seed in mind more than a test of horticultural or pathological desirability. There were no commercial potatoes nearer than 3 miles. Hail damaged the plot in late June, but a fair crop was produced and an excellent test for scab resistance was obtained also. Nine lots of seedling selections were planted and harvested. Schaal table 2 shows the results of this plot. Nebraska seedling 120, 209, and 213 showed considerable promise here, but all were very susceptible to scab. An Iowa selection, Ia. 136-42, an oblong, white tuber type was highly resistant to scab and produced a desirable type and yield.

Schaal table 2. Ault, Colorado, seedling test plot. 1952

Seedling No.	Tuber color	Tuber size & shape	Tuber set	Scab pustule type	Tuber abnormalities
				No.	
Neb. 209	Dark red	Flat, oblong to oval	Medium	4	Rough stem end. Deep blossom end.
" 120	White	Round	"	2 & 4	Smooth, shallow eyes. Some greening.
" 311	Deep red	Round to flat	"	4	Russet type red skin. Rough.
" 25	Lt. red	Round to oblong	Medium to heavy	4	Flat type of tuber. Smooth.
" 213	Bright red	Small, round to oblong	Heavy	4	Some quite rough
" 225	Med. red	Medium	Medium	4	Growth cracks.
CS 10185	Russet	"	"	1	Fair type of round, russet.
US 96-56	White	Round to oblong, small	Medium to heavy	2	Irregular shaped tubers.
Ia 736-42	White	Oblong to long	Medium	1	Some pointed ends.

Variety Trials, Matanuska, 1951

Intensive studies of the potato have been conducted in Alaska since 1948. The information from these studies will appear in a separate publication. The purpose of this report is to indicate which varieties and selections were best adapted to this region in 1951.

Potato breeding and variety testing are aimed at producing a potato of good quality and high yielding ability when dug by August 25 or one month earlier than is the common practice. A better potato than Arctic Seedling is necessary both for the early crop and the main crop because it has very deep-set eyes, low yield per acre of U.S. No. 1 tubers if dug early in September, very tender skin, and scab susceptibility. From the standpoint of the producer these faults are serious because storage space for the main crop is inadequate and the low yield at early harvest is unprofitable. Thus the search for an early, heavy-yielding potato has necessarily involved screening tests of many varieties.

Material for the late harvest test in 1951 consisted of 52 varieties (19 named commercial varieties and 33 numbered selections) chosen from the results of previous work. A randomized block design of 4 replicates was used. All studies were based on 25-foot plots of 20 cut seed pieces per plot. The crop was planted May 27 and harvested September 27. Premerge was used as a complete cover spray at the rate of 8 quarts in 18 gallons of water per acre. A single application made when 1 to 5 percent of the potato hills were breaking ground eliminated all chickweed and lamb's-quarters /made it unnecessary to till the crop except for hilling. This very successful weeding operation has been adopted by growers with equal success.

The 20 leading varieties and selections are presented in Alaska table 1 with their respective yields and specific gravities. Dry-and wet-weight measurements taken on a 20-pound sample from each plot were used for determining the specific gravity.

From the standpoint of yield and specific gravity the numbered selections compare favorably with the commercial varieties. However, the attractiveness of the tubers and the potential marketability of the 20 varieties are vastly different. Among the named varieties only Knik, Kennebec, Ontario, and Pawnee are superior to Arctic, whereas among the numbered selections 47.44-3-47, 54.44-1-46, 6.47-1-50 and 10.44-2-46 are superior to Arctic. Rearranging these 8 varieties in a single order of preference for yield and marketability, Knik is the first choice followed by 47.44-3-47, 54.44-1-46, 10.44-2-46, 6.47-1-50, Kennebec, Ontario, and Pawnee.

1/ Horticulturist, Alaska Agricultural Experiment Station, Palmer, Alaska

Alaska table 1. Yield and specific gravity of the 20 highest yielding potato varieties and selections, Matanuska, 1951.

Variety	Yield per acre U.S. No. 1	Total solids	Seedling	Yield per acre U.S. No. 1	Total solids
	Bu.	Pct.		Bu.	Pct.
Ontario	473	18.5	47.44-3-47	468	19.5
Knik ^{1/}	425	18.7	15.45-1-47	451	21.7
Marygold	421	18.1	54.44-1-46	449	19.7
Houma	419	19.5	47.44-1-47	432	21.0
Arctic	414	22.5	26.44-1-46	428	20.4
Gr. Mountain	413	22.0	6.47-1-50	427	17.6
La Salle	405	20.2	26.42-1-44	414	16.9
Kennebec	397	19.8	10.44-2-46	414	18.9
Swiss	393	22.0	22.44-3-46	401	20.9
Pawnee	381	18.5	44.41-2-43	399	20.5

1/ Formerly selection 57.44-3-46 introduced to foundation stock seed growers in 1952 with description in press.

Although none of these varieties or selections equal Arctic in specific gravity readings each has some very desirable characteristic such as productivity, tuber shape, skin texture, skin color, shallow eye, small vine or good eating quality.

Since the primary interest was to develop a potato for early harvest, a replicated test of 75 varieties and numbered selections was also conducted in 1951. The stocks for this test were planted May 20 and harvested August 25. The yield and specific gravity of the 10 leading varieties and numbered selections considered satisfactory for the consumer are listed in Alaska table 2.

Alaska table 2. Yield and specific gravity of early harvest potatoes, Matanuska, 1951.

Variety or seedling	Yield per acre U.S. No. 1	Specific gravity
	Bu.	
Pawnee	328	1.0725
Ontario	317	1.0698
10.44-2-46	300	1.0724
6.47-1-50	294	1.0631
Alaska	292	1.0702
Arctic	279	1.0789
Knik	271	1.0703
47.47-1-50	258	1.0813
Kennebec	257	1.0735
55.44-3-46	249	1.0795

Selection 47.44-3-47 listed in Alaska table 1 was not included in this year's early harvest test because its performance in other years had been such that all of the seed on hand was considered more valuable for increasing the line for distribution.

In both the early and late harvest tests, Ontario made a good crop of tubers. One of its greatest attributes is its high resistance to scab. Occasionally, a poor stand was obtained because a seed piece produced small tubers directly from the cut seed without developing a top. This was not a result of rhizoctonia. Ontario breaks dormancy after being stored for 10 weeks which materially reduces its value as a main-crop potato. Houma also breaks dormancy after a short period in storage. La Salle was discarded because it became infected with ring rot.

Selections 10.44-2-46 and 47.44-3-47 are considered the outstanding potatoes from the standpoint of early harvest. Both are of the low tuber per hill type, tubers are set early, develop rapidly, have an attractive skin and are produced by a relatively small vines. Both selections were studied in a spacing-fertilizer test in 1952 in anticipation of their introduction to stock seed growers in 1953. The data from this test have not been assembled as yet but the yield of both selections looked very good at early harvest.

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CALIFORNIA
Glen N. Davis

Potato plots were grown in Kern and San Benito Counties in 1952. In Kern County two plots were harvested. In one plot, Calif. table 1, four varieties and seven numbered seedlings were tested for yield and specific gravity. Because of the amount of seed available a uniform number of replications could not be planted so no attempt at statistical analysis of the data was made. It is evident, however, from the data in Calif. table 1 that the check variety, White Rose, equaled or exceeded in yield everything tested in 1952. It is equally evident that with the exception of seedling, X-100, all lots tested were considerably above White Rose in specific gravity, indicating higher quality.

Calif. table 1. Potato variety test-Kern county, Calif., 1952.

Variety or seedling	Yield					Mean	Dry matter
	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Rep. 5		
	Lb.	Lb.	Lb.	Lb.	Lb.		Pct.
White Rose	47.0	54.5	44.0	45.0	40.5	46.2	19.2
Kennebec	35.0	42.5	42.0	39.0	38.0	39.3	20.7
Cobbler	33.5	32.5	34.5	37.5	38.5	33.3	21.4
Sequoia	50.0	49.5	41.0	44.0	41.0	45.1	20.5
2102-11	44.5	47.0	40.5			44.0	21.7
2102-13	39.5	34.5				37.0	21.2
X-100	24.0	27.5				25.7	17.4
73-10	43.5	47.0				40.2	20.7
595-76	43.0	35.5				39.2	21.9
2070-42	45.0					45.0	20.4
919-15	34.5					34.5	23.0

Table 2 is a presentation of the data from the scab-resistance plot. Sixty-five varieties and seedlings were included with White Rose as the check. While only one seedling, B 3015-23, was completely free from scab, two varieties, Cayuga and Cherokee, and 17 seedlings showed sufficient resistance that 100 percent of the tubers were marketable. Seed from a number of these seedlings was saved for yield tests and further testing for scab resistance in 1953. The varieties, Cherokee and Cayuga, and the 10 best-looking seedlings from the scab plot were tested for specific gravity. White Rose was the check. These data are presented in Calif. table 3.

In San Benito County, six varieties and seven numbered seedlings were tested for yield, specific gravity, and resistance to Verticillium wilt, (Calif. table 4). Here, as in the Kern County test, a uniform number of replications was not planted and no statistical analysis of the data was attempted. It may be noted that all yields recorded are extremely low. This was due to a severe infestation of Leak caused by Phythium. The same low yields were evidenced in the commercial plantings throughout the area in 1952.

Calif. table 2. Potato scab-resistance test plot, Kern County, 1952.

Variety or seedling	Tubers	Classes of scab								Ave.	Market Pct.
		0	1	2	3	4	5	6	7		
White Rose ck.	No. 226	4	25	38	56	59	44			3.2	29
B 3015-23	15	15								.0	100
B 2162-36	65	52	13							.2	100
B 2920-20	52	42	10							.2	100
B 2369-4	58	47	11							.2	100
B 2969-12	50	36	13	1						.3	100
B 2921-4	69	39	30							.4	100
B 2875-7	34	24	8	2						.4	100
B 2162-49	41	20	21							.5	100
B 3009-7	60	28	27	5						.6	100
B 2368-6	57	18	32	7						.6	100
B 2900-42	23	12	8	3						.6	100
Cayuga	63	21	38	4						.7	100
Cherokee	68	25	34	9						.8	100
Neb. 59-4	64	18	33	13						.9	100
B 2920-13	64	11	47	6						.9	100
B 2070-42	65	19	34	12						.9	100
B 2879-7	31	3	23	5						1.1	100
B 2331-1	55	11	31	13						1.3	100
B 2173-22	40	1	23	16						1.4	100
B 2067-1	70	40	28	1	1					.5	98
B 2914-1	48	23	21	3	1					.6	98
B 2914-1	48	23	21	3	1					.6	98
B 73-10	58	26	16	13	3					.9	94
B 2879-4	0	21	25	21	2					1.0	66
B 2892-3	46	10	15	18	2	1				1.1	94
B 402-1	47	7	25	13	2					1.2	93
B 2069-74	74	19	31	13	10	1				1.2	85
B 515-2	45	12	5	19	9					1.3	80
B 2900-24	53	7	25	15	6					1.4	88
B 2102-13	52	0	33	18	1					1.4	98
B 2368-13	64	14	21	17	12					1.4	81
B 3009-9	66	5	36	18	7					1.4	89
B 2887-2	50	9	17	14	10					1.5	80
B 2784-3	66	10	22	18	16					1.6	76
B 3014-5	63	12	15	20	16					1.6	74
B 2102-11	60	8	26	15	11					1.6	81
B 3003-27	54	5	20	16	10	3				1.7	76
B 2337-7	42	2	12	18	8	2				1.9	76
B 2861-1	52	0	14	29	9					1.9	82
B 73-23	45	1	10	13	17	4				2.0	53
B 2875-6	87	0	32	27	18	10				2.0	68
B 2935-7	52	1	13	17	21					2.1	59
B 2922-15	103	1	11	37	32	22				2.1	47
B 2888-2	56	0	14	24	16	2				2.1	68
X-100	45	0	10	15	20					2.2	50
B 3014-6	73	5	22	14	14	19				2.2	55

Calif. table 2. continued.

Variety or seedling	Tubers No.	Classes of scab								Ave.	Market Pct.
		0	1	2	3	4	5	6	7		
B 2921-10	64	0	13	22	28	1				2.3	54
B 2893-11	61	0	13	18	30					2.3	49
B 2968-56	66	0	17	16	29	4				2.3	50
B 919	86	0	17	25	34	10				2.4	49
B 2879-5	63	0	12	11	37	3				2.5	36
B 2340-2	61	2	12	15	20	12				2.5	47
B 2922-29	20	0	0	10	10					2.5	50
Progress	82	0	7	14	38	23				2.8	25
B 2922-26	52	2	8	11	13	13	5			2.8	40
B 2900-54	54	0	6	10	18	20				3.0	29
B 3008-10	69	0	6	11	25	27				3.0	24
B 595-76	68	1	9	15	11	17	9	6		3.0	37
B 3004-7	38	0	0	6	17	15				3.2	16
B 3003-36	47	0	0	5	22	20				3.3	11
B 2874-4	86	0	7	12	32	20	14	1		3.3	22
R. Burbank	69	0	1	3	21	42	2			3.6	6
B 2924-2	73	0	5	4	10	27	27			3.9	12
B 904-6	47	0	0	1	8	29	9			4.0	2

Key to classes of scab.

0 = free from scab

1 = 1% of surface area covered with scab.

2 = 5% " " " " " "

3 = 15% " " " " " "

4 = 25% " " " " " "

5 = 35% " " " " " "

6 = 60% " " " " " "

7 = 90% " " " " " "

Classes 0, 1, and 2 considered marketable.

A check on the resistance or tolerance to Verticillium wilt was made on September 29. On this date practically all of the vines on the check variety, Russet Burbank, were dead or nearly so. Resistance is indicated by the continued growth of green vines. The results are given in Calif. table 5.

Calif. table 3. Specific gravity of some lines of potatoes showing high scab resistance, Kern Co., 1952.

Variety or seedling	Dry matter
	Pet.
Cherokee	20.5
Cayuga	20.9
Neb. 59-41	21.2
2162-49	19.4
2162-36	23.0
2875-7	20.4
2900-42	29.9
2921-4	19.2
2920-20	19.9
2969-12	21.9
2067-1	19.9
2368-6	17.3
*White Rose	19.2
*Check	

Calif. table 4. Hollister potato test plot, 1952.

Variety or seedling	Yield										Dry matter
	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Rep. 5	Rep. 6	Rep. 7	Rep. 8	Rep. 9	Rep. 10	Mean
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Pct.
*Russet Burbank	1.25	2.75	4.00	8.50	2.75	10.75	8.25	6.00	20.75	6.2	19.4
Kennebec	7.25	13.50	18.25	20.75	37.75	45.75	36.00	15.25	5.50	6.50	19.4
Sequoia	14.75	28.25	32.00	35.00	29.25	55.50	43.00	29.25	14.00	29.50	19.9
White Rose	6.75	8.50	13.00	15.25	12.00	7.75	7.75	13.25	10.75	16.50	17.9
Ontario	6.75	14.75	11.25	8.0	9.0	21.75	10.25	13.50	8.25	7.75	19.2
Cobbler	8.00	3.00	3.75	16.25	10.00	8.75	2.75	2.25	6.00	15.75	19.2
2103-13	7.25	7.50									1/
2102-11	12.25										12.25
585-76	3.25										3.25
X-100	7.00										7.00
73-10	4.75										4.75
2070-42	7.50										7.50
2968-56	4.25										4.25

1/ Yield too small to run sp. gr.

* Check.

Calif. table 5. Resistance to verticillium wilt, Hollister, Calif., 1952.

Variety or seedling	Repli- cations	Repli- cations green	Repli- cations declining	Repli- cations vines dead
	No.	No.	No.	No.
* Netted Gem	9	0	7	2
Kennebec	10	1	8	1
Cobbler	10	0	0	10
Sequoia	10	8	1	1
White Rose	10	4	4	2
Ontario	10	8	1	1
2968-2	1	0	0	1
2102-13	1	1	0	0
2070-42	1	1	0	0
X-100	1	0	0	1
595-76	1	1	0	0
73-10	1	0	1	0
2102-11	1	1	0	0

* Check.

CONNECTICUT
Arthur Hawkins

Two yield tests were conducted in Connecticut in 1952, located on commercial farms in the Connecticut River Valley.

At Windsorville, varieties resistant to late blight produced large yields. (Conn. table 1.), having been planted on good potato soil in good state of fertility following tobacco the previous 2 years and well fertilized. Irrigation was used. As a result of missing a spray of nabam + Zn SO₄ in the latter part of August, late blight became serious the first of September in the low end of the field where the test plot was located.

Relatively low yields of blight-susceptible varieties, such as Houma, were obtained because of late blight.

Immaturity at time of death of the plants of the late-blight-susceptible varieties probably resulted in lower specific gravity of tubers produced.

Yields at Ellington, Conn., are shown in Conn. table 2. This land had been in potatoes the previous 2 years. Verticillium wilt occurred in varieties during the latter part of August; most had relatively little green foliage on September 19.

Conn. table 1. Yields of potato varieties and seedlings at Windsorville, Conn., 1952. (Yield and specific gravity differences affected by earlier death by late blight of susceptible varieties).

Variety or seedling	Total yield per acre	Yield per acre over 1-7/8"			2/ Specific gravity	Dry matter
				Free of 1/ off-shape		
	Bu.	Pct.	Bu.	Bu.		Pct.
Cherokee	468	70.2	329	308	1.069	17.3
Gr. Mountain	701	91.5	641	497	1.080	19.7
Houma	493	77.7	383	368	1.063	16.0
Houma (12") ^{1/}	587	82.8	486	460	1.068	17.2
Irish Cobbler	484	89.6	434	418	1.071	17.7
Katahdin	605	93.9	568	563	1.066	16.7
Kennebec	983	95.1	935	859	1.073	18.2
Pungo	903	93.2	842	830	1.073	18.2
Russet Rural	529	84.1	445	340	1.071	17.7
Teton	607	92.1	559	549	1.064	16.3
B 73-10	514	97.1	499	499	1.071	17.7
B 355-44	783	94.4	739	695	1.080	19.7
B 446-8	915	82.4	754	673	1.062	15.8
B 606-67	1062	92.4	981	891	1.079	19.5
B 515-2	466	94.8	442	362	1.061	15.6

^{1/} Serious off-shape removed.

^{2/} Specific gravity by salt solution method. Average of 12 tubers per sample, x 4 replications.

Soil: Hartford fine sandy loam; previous 2 years in tobacco.

1/ Spacing: 9"; Houma also at 12".

Fertilizer: 1,200 castor Pomace broadcast, plus 3,000 5-8-7 in row.

Seed: Seed supplied through cooperation of R. V. Akeley, Horticulturist, Division of Veg. Crops and diseases, U.S.D.A., Presque Isle, Maine; except Maine certified Houma. Cut seed approximately $1\frac{1}{2}$ oz.

Season: Latter part of July exceedingly hot and dry (except irrigation available), followed by ample rainfall.

Tubers: Season accounts for off-shape; also 25% hollow heart in Green Mountain and Rural; some in other varieties. B 446-8 -- 30% of tubers had Internal Drought Spot.

Size of Plots: 1 row 24 feet long; Replication: 4, in four randomized blocks (3x5).

Conn. table 2. Yields of potato varieties and seedlings at Ellington, Conn. 1952^{1/}. (Verticillium wilt resulted in most dead by September 19)

Variety or seedling	Total yield per acre	Yield per acre over 1-7/8"			Specific gravity	Dry matter
				Free of off-shape		
	Bu.	Pct.	Bu.	Bu.		Pct.
Cherokee	348	63.7	222	187	1.068	17.2
Gr. Mountain	601	86.5	520	445	1.081	19.9
Houma	767	89.3	685	660	1.072	18.0
Houma (12")	839	91.7	769	736	1.075	18.7
Cobbler	406	83.8	340	339	1.066	16.7
Katahdin	621	93.1	587	576	1.068	17.2
Kennebec	552	84.3	465	457	1.060	15.5
Pungo	519	91.7	476	467	1.071	17.7
Russet Rural	483	83.5	403	316	1.074	18.4
Teton	675	91.2	616	595	1.067	16.9
B 73-10	398	89.0	354	354	1.065	16.5
B 355-44	424	89.6	380	357	1.075	18.7
B 446-8	521	83.1	433	386	1.060	15.5
B 515-2	358	84.0	301	278	1.055	14.5
B 606-67	784	91.0	713	560	1.071	17.7

1/ See footnotes for table 1 relative to spacing, layout, seed.

Soil: Land in potatoes previous 2 years.

Fertilizer: 2,500 8-12-12.

Season: See table 1, irrigation also available.

Tubers: Considerable off-shape in most varieties and seedlings, especially Cherokee, Gr. Mountain, Russet Rural, and B 606-67; B 446-8 - 15% of tubers had internal brown spots.

DELAWARE
E. P. Brasher

Sixteen named and numbered varieties and seedlings were tested at the Delaware Agricultural Experiment Station in 1952. The experimental procedure and conditions were as follows:

Location: University Farm, Newark

Soil: Sassafras loam of moderate fertility

Previous Crop: Corn

Cover Crop: None

Plot Size: 25 x 3 $\frac{1}{2}$ feet (29 seed pieces were planted in each 25-foot row.)

Plot Design: Randomized block

Replications: Five

Planting Date: April 4

Fertilizer: 1,400 pounds of 8-16-16 per acre, in bands at planting time.

Fungicide: Dithane Z-78

Insecticide: DDT

Growing Conditions: Poor, due to the abnormal heat and drought that prevailed during June and July.

Although the abnormal heat and drought that prevailed in Delaware during June and July greatly reduced yields, some interesting characteristics of several varieties were revealed. The yield of No. 1 potatoes, as shown in table 1, varied from a high of 207 bushels per acre with Pungo to a low of 48 bushels with Kennebec. There were two factors that probably reduced the yield of Kennebec: First, the seed stock was home-grown, whereas the stocks of all other varieties were produced by the U.S.D.A. in Maine. Second, the environmental conditions were more favorable for early than for late varieties.

Of all the varieties and seedlings tested B 73-18 appeared to be the most outstanding. It produced yields comparable with or better than those of the standard varieties: it produced the highest percentage of No. 1 potatoes; it was the most attractive potato grown in the test; and its specific gravity was significantly higher than that of most other varieties. Since this is the third successive year that B 73-18 has performed in this manner, it appears that it will replace some of the present varieties grown in Delaware when seed stock becomes available.

Three other promising varieties and seedlings were Pungo, B 73-10, and B 75-4. Pungo was outstanding for earliness and yielding ability; B 73-10 for the production of a high percentage of No. 1 potatoes and attractiveness; and B 75-4 for high specific gravity.

Delaware table 1. Yield and specific gravity of potato varieties and seedlings grown at Newark, Delaware, 1952.

Variety or seedling	Yield per acre			Dry matter
	U.S. No. 1	U.S. No. 1 + U.S. No. 2	U.S. No. 1	
	Bu.	Bu.	Pct.	Pct.
Pungo	207	253	82	15.7
Teton	205	261	79	15.6
B 73-10	193	226	85	15.7
B 73-18	168	195	86	16.9
B 355-35	164	225	73	15.6
Chippewa	156	191	82	15.6
B 355-44	146	194	75	16.0
Irish Cobbler	140	202	69	16.0
B 73-3	138	184	75	16.3
B 351-44	134	220	61	15.8
B 75-4	118	149	79	17.7
B 637-14	117	148	79	15.5
B 515-2	117	159	74	15.6
Katahdin	110	146	75	15.6
B 447-98	61	171	36	-
Kennebec	48	66	73	-
L.S.D. 5% level	85	69	--	0.08

FLORIDA (Homestead)

Geo. D. Ruehle and J. C. Noonan

The potato variety trials were conducted at the Sub-Tropical Experiment Station in cooperation with the southeastern section of the U.S.D.A. potato breeding program.

Three variety trials, replicated, non-replicated, and observational, were conducted concurrently during the winter. Dry weather may account for the stunted plants and lower yields.

The potatoes were grown on marl soil, typical of the potato-growing area, the pH of which is approximately 7.8. They were fertilized with 1,500 pounds per acre of a 2-10-10-2-1 mixture. Each variety was replicated four times and each replication was 75 feet long. The specific gravity was run on representative lots of each variety by the use of varying concentrations of sodium chloride in water.

There were 50 seedling lines under observation for adaptability. Only 8 were judged worthy of further trials. Dakota Chief, Bliss Triumph mutation, La Soda, Bliss Triumph, and four numbered seedlings were compared in the replicated yield trial. The results are given in Ruehle and Noonan table 1.

Ruehle and Noonan table 1. Yield per acre, specific gravity, and dry matter, of the varieties and seedlings in the replicated trials.

Variety or seedling	Yield per acre	Specific gravity	Dry matter
	Bu.		Pct.
Dakota Chief	396	1.0650	16.5
Bliss Mutation	408	1.0750	18.6
La Soda	211	1.0650	16.5
Bliss Triumph	309	1.0650	16.5
L82-265	301	1.0650	16.5
L82-269	336	1.0650	16.5
1345	260	1.0650	16.5
1354	362	1.0750	18.6
L.S.D. at 5% level	48		
" " 1% "	66		

Dakota Chief and Bliss mutation gave the highest yields and significantly outyielded Bliss Triumph. The potatoes were sprayed regularly with dithane-zinc sulfate and DDT spray as protection against late blight and insects.

FLORIDA

A. H. Eddins, E. N. McCubbin, and R. W. Ruprecht

Approximately 15,500 acres of potatoes were grown in the Hastings Area in 1952. Of this acreage 95 percent or more was planted to Sebago. Miscellaneous varieties grown were Red Pontiac, Irish Cobbler, Red Warba, Kennebec and Cherokee. Record yields were produced; the highest reported from an individual field was 583 bushels of marketable tubers per acre. The average yield was about 300 bushels per acre, which exceeded that of 1951 by 15 bushels. High yields in 1952 are attributed to exceptionally good growing conditions and better control of late blight than in previous seasons. No harmful rains occurred during the latter part of the season, and most fields were irrigated when needed.

Varieties and Seedling Selections: Seven varieties, 10 U.S.D.A. seedling selections and 3 Canadian selections were grown in replicated, randomized plots at Hastings, and the same varieties and 3 seedling selections also were tested at Sanford. None of the varieties and selections significantly excelled Sebago in yield at Hastings except red Warba (Fla. table 1). At Sanford, Kennebec, Pungo, and Red Warba significantly outyielded Sebago by 88 to 104 bushels per acre.

The varieties varied in their susceptibility to skinning, browning, scab, and injury (Fla. table 2). There was much less skinning and browning in tubers of Cherokee than in Sebago, and Kennebec was more susceptible to these defects than Sebago. Scab was seen on the tubers of 1551, L.D81-113, Kennebec, 2471, and 2402. Cherokee is a good variety for early harvest, but near maturity knobs form on the tubers at the eyes and stem end. None of the white-skin varieties and selections appear as well adapted to the Hastings and Sanford areas as Sebago. Red Warba may be suitable for commercial production at Sanford where red-skin varieties are more popular than at Hastings.

Seedling Selections: Ten to 25 hills of each of 44 U.S.D.A. seedling selections were grown in observational plots at Hastings. The plants were sprayed 4 times with DDT (1 qt. 25% emulsion-100 gals. water per acre); no fungicides were used. The plants were inspected several times during the growing season for foliage diseases. Yields and other characteristics were determined by inspection immediately after the potatoes were dug and placed on top of the rows. Results are recorded in Fla. tables 3 and 4.

The selections 1236, 1551, 3273, and 3674, produced a heavy set of tubers and good yields; however, late blight was present on the foliage of 1551. The tubers of 1551 possessed yellow flesh and therefore do not meet present market requirements. The four selections except 3273 were fairly mature when dug. All except 1236 showed a trace of knobs. The other 40 selections were inferior to the above 4 on account of susceptibility to blight, medium to very poor tuber set, poor to very poor yields, and tuber defects.

Florida table 1. Yields of potato varieties and seedling selections grown in two locations in Florida in 1952.

Variety or selection <u>1/</u>	Bushels U.S. 1A tubers per acre				Starch
	At Hastings:		At Sanford:		
	Total	Yield compared with Sebago	Total	Yield compared with Sebago	
	Bu.	Pct.	Bu.	Pct.	Pct.
Red Warba	416	111	362	140	12.7
1551	399	106	-	-	14.9
Red Pontiac	398	106	317	123	12.4
B 351-44	385	103	-	-	14.7
Sebago	375	-	258	-	12.7
1894	371	99	-	-	15.2
338	358	95	-	-	13.9
L.D81-113	356	95	-	-	12.7
584	353	94	-	-	14.9
Cherokee	353	94	333	129	13.2
Kennebec	349	93	346	134	14.4
Pungo	342	91	347	135	14.2
Minn. New White	329	88	221	86	13.4
599	314	84	-	-	14.7
658	301	80	-	-	11.9
F1464-26	291	78	287	111	15.4
2471	284	76	-	-	14.4
F396	263	70	303	117	13.4
F451	205	55	232	90	14.4
2402	188	50	-	-	14.4
L.S.D.	40		87		

^{1/} Each replicated 6 times in randomized plots with seed pieces planted 1 foot apart in rows 20 feet long and 40 inches apart at Hastings and in rows 25 feet long and 30 inches apart at Sanford.

Florida table 2. Defects and injuries of tubers of 20 potato varieties and seedling selections grown at Hastings, Florida, 1952. ^{1/}

Variety of selection	Tuber			
	Skinning ^{2/}	Browning ^{3/}	Scab ^{4/}	Injuries ^{5/}
Red Warba	M	M	N	M
1551	M	VS	L	F
Red Pontiac	M	VS	N	M
B 351-44	M	VS	N	E
Sebago	M	S	N	M
1894	M	S	N	M
338	L	M	N	F
L.D81-113	S	S	M	F
584	S	VS	N	E
Cherokee	L	L	N	F
Kennebec	S	VS	M	M
Pungo	L	M	N	F
Minn. New White	S	S	N	E
599	L	M	N	F
658	L	L	N	M
F1464-26	S	VS	N	F
2471	M	VS	S	M
F396	VS	VS	N	F
F451	VS	VS	N	F
2402	M	M	L	E

^{1/} Based upon the examination of 30 to 37 tubers of each variety or selection drawn from the different replicates one day after the potatoes were dug, graded, and weighed.

^{2/} Percentage of skin removed in digging and handling:

L = 3 to 9%
M = 10 to 14%
S = 15 to 20%
VS = 21 to 29%

^{4/} Percentage of tubers with scab lesions:

N = none
L = 5% or less
M = 6 to 15%
S = 16 to 35%

^{3/} Percentage of tubers with skinned areas which turned brown:

L = 1 to 15%
M = 16 to 30%
S = 31 to 60%
VS = 61 to 90%

^{5/} Percentage of tubers with cracks and bruises:

F = less than 15%
M = 16 to 30%
E = 31 to 50%

Florida table 3. Yields and other characteristics of 44 U.S.D.A. potato seedling selections grown at Hastings, Florida, in 1952.

Seedling ^{1/} selection	Parentage	Set	Yield	Late blight	Maturity ^{2/}
580	Mohawk x 96-56	Medium	Good	-	3
632	Houma x 96-56	"	"	-	4
658	Sebago x 47156	"	"	-	5
1236	Sebago x L372-1	Heavy	"	-	5
1551	No Blight x 47156	"	"	Present	5
1823	L313-1 x L164-3	Medium	"	"	4
1894	Sebago x B 81-40	Heavy	Medium	-	5
1928	792-94 x 96-56	"	"	-	4
2055	Ostbote x Katahdin	Medium	"	Present	5
2103	Katahdin x Triumph	"	"	"	5
2109	B 81-40 x 927-3	Poor	"	-	3
2188	1276-185 x 96-56	Medium	"	-	5
2215	B 76-23 x Chippewa	"	"	Present	5
2219	" x "	Poor	Poor	"	3
2349	B 56-1 x B 594-46	Medium	Good	-	2
2396	B 76-23 x 792-94	Poor	Poor	-	1
2402	" x "	"	"	-	4
2461	B 381-2 x 96-56	Medium	Medium	-	2
2473	" x "	"	Good	-	2
2988	B 61-3 x Katahdin	"	"	-	3
3061	B 2076	Poor	Poor	*	4
3260	B 2722	V. poor	V. poor	-	2
3266	T15 x B 355-24	Medium	Medium	-	3
3269		Poor	Poor	-	3
3273	T15 x B 355-24	Heavy	Good	-	3
3284	B 81-40 x 245-186	Medium	Medium	-	3
3674	B 446-54 x Teton	Heavy	Good	-	5
3675	" x "	Medium	Poor	-	5
3676	" x "	Heavy	Medium	-	3
3684	" x "	Medium	Poor	-	2
3733	B 779-9 x B 434-57	"	Medium	Present	4
3769	Kennebec x B 522-33	"	Good	"	1
3778		"	Medium	-	2
3951	B 61-3 x B 402-1	"	"	-	4
3954	B 76-23 x 157-9	Heavy	"	-	3
3956	B 76-23 x B 445-41	Medium	Poor	-	5
3962	" x "	Poor	"	-	5
3988	B 607-37 x B 607-56	"	V. poor	-	3
3996		Medium	Good	-	4
4063	B 607-37 x B 607-56	V. poor	V. poor	-	3
2215	B 76-23 x Chippewa	Medium	Medium	Present	2
L.D81-185	B 56-1 x 76-23	"	Good	-	3
1345	Pontiac x 15-2 Selfed	"	Medium	Present	4
ND 457		Medium	"	"	3

^{1/} Twenty-one to 25 hills of the selections were grown except for 3260 and ND457 of which 17 and 10 hills, respectively, were grown. Planted Jan. 16 and dug April 30.

Florida table 3 continued.

2/ Refers to condition of foliage when dug: 1 = 0 to 20 percent dead;
 2 = 21 to 40 percent dead; 3 = 41 to 60 percent dead; 4 = 61 to 80
 percent dead; 5 = 81 to 100 percent dead.

*Eleven of 23 plants affected with mosaic.

Florida table 4. Characteristics of tubers of 44 U.S.D.A. potato seedling
 selections grown at Hastings, Florida, in 1952.

Seedling No.	Parentage	Shape ^{1/}	Eye ^{2/} depth	Skin ^{3/}		Flesh ^{4/}	Lenti- cels ^{5/}
				Color	Marks		
580	Mohawk x 96-56	p	s	w	-	w	n
632	Houma x "	ov to p	s	w	k-trace	w	n
658	Sebago x 47156	"	s	y	"	y	n
1236	" x L372-1	ov	s	w	-	w	n
1551	No Blight x 47156	ov to o	s	y	k-trace	y	n
1823	L313-1 x L164-3	ov	s	w	-	w	c
1894	Sebago x B81-40	ov to o	m	w	k-trace	w	n
1928	792-94 x 96-56	"	s	w	-	w	n
2055	Ostbote x Katahdin	"	m	w	-	w	m
2103	Katahdin x Triumph	o	m	w	-	w	n
2109	B81-40 x 927-3	ov to o	s	w	-	w	n
2188	1276-185 x 96-56	ov	d	w	k-severe	w	n
2215	B76-23 x Chippewa	ov to o	m	w	-	w	m
2219	" x "	"	s	w	-	w	m
2349	B56-1 x B594-46	o to p	m	w	k-trace	w	m
2396	B76-23 x 792-94	ov to p	s	w	k-trace	w	m
2402	" x "	ov	m	w	-	w	n
2461	B381-2 x 96-56	o	m	w	-	w	n
2473	" x "	ov,r	m	w	k-trace	w	m
2988	B61-3 x Katahdin	o to p	m	w	"	w	m
3061	B2076	ov to o	m	w	"	w	m
3260	B2722	"	s	w	-	w	m
3266	T15 x B355-24	"	s	w	-	w	m
3269	"	"	s	w	k-trace	w	n
3273	T15 x B355-24	ov to o,r	m	w	"	w	m
3284	B81-40 x 245-186	ov to o	m	w	-	w	c
3674	B446-54 x Teton	"	m	w	k-trace	w	m
3675	" x "	"	m	w	"	w	m
3676	" x "	"	m to d	w	-	w	n
3684	" x "	"	m	w	k-trace	w	m
3733	B779-9 x B434-57	"	s	w	-	w	m
3769	Kennebec x B522-33	"	s	w	k-trace	w	m
3778		o to ov	d	w	"	w	n
3951	B61-3 x B402-1	o to p	m	w	"	w	m
3954	B76-23 x 157-9	ov to p	s	y	"	y	m
3956	B76-23 x B445-41	ov to o	s	w	"	w	m
3962	" x "	ov	m	w	"	w	m
3988	B607-37 x B607-56	"	s	w	-	w	m

Florida table 4 continued.

Seedling No.	Parentage	Shape	Eye 2/ depth	Skin 3/		Flesh 4/	Lenti-5/ cels
				Color	Marks		
3996		o	s	w	-	w	m
4063	B607-37 x B607-56	ov to o	s	w	-	w	m
2215	B76-23 x Chippewa	ov	m	w	-	w	m
L.D81-185	B56-1 x 76-23	"	d	w	k-trace	w	m
1345	Pontiac x 15-2 Selfed	rb	d	r	-	w	m
ND457		ov	m	w	-	w	m

1/ Shape	2/ Eye depth	3/ Skin color	4/ Flesh	5/ Lenticels
o = oblong	s = shallow	w = white	w = white	n = not con-
ov = oval	m = medium	r = red	y = yellow	spicuous
p = pear	d = deep	y = yellow		m = medium con-
rb = round blocky				spicuous
r = rough		Marks		c = conspicuous
		k = knobs		

IOWA
W. J. Hooker

Late blight resistance of U.S.D.A. potato clones, Iowa Greenhouse tests
May 1952

Progeny number in test	1952 field No.	Progeny	Late blight race					
			Iowa	B	C	D	BC	BD
62	537	B96-56	R	R	R	S	S	S
39	V.T.	B515-2	S	S	S	S	S	S
0	165	B595-76	R	R	R	R	R	S
46	171	B606-67	R	R	R	S	R	S
50	158	B776-2	S	S	S	S	S	S
51	159	B779-1	R	R	R	S	S	S
49	160	B780-27	S	S	S	S	S	S
52	168	B792-88	S	S	S	S	S	S
53	112	B792-94	S	S	S	S	S	S
27	161	B874-24	R	R	R?	S	S	S
35		B874-25	S	S	S	S	S	S
12	396	B920-7	R	R	-	S?	S	S
63	191	B922-3	R	R	S	D	S	R
64	192	B922-5	R	R	R	R	S?	R
65	193	B922-6	R	R	R	R	R	R
47	194	B922-8	R	R	S	R	R	R
66	195	B922-12	R	R	S	R	S	R
56	196	B922-13	S	S	S	S	S	S
1	181	B926-9	S	S	S	R	S	S
11	162	B962-32	R?	R	R	R?	S	S
4	239	B991-3	R?	R?	S	D	R?	S
8	207	B991-14	R	R	R?	R	S	S
14	313	B1270-7	R	R	R	D	S	S
15	315	B1270-10	R	R	R	R	R?	S
57	167	B1276-165	S	S	S	-	S	S
40	208	B2067-1	S	S	S	S	S	S
60	210	B2068-23	S	S	S	S	S	S
41	225	B2368-4	S	S	S	-	S	S
42	226	B2368-6	S	S	S	D	S	S
31	237	B2874-4	R?	R?	R?	S	R	S
32	239	B2875-8	R	R	R	S	R	S
33	240	B2876-1	R?	R	R	R?	R?	S
58	215	B2897-4	S	S	S	S	S	S
59	246	B2897-7	S	S	S	S	S	S
17	252	B2900-54	R	R	S	-	R	S
16	253	B2900-59	R	R?	R	R?	S	S
9	255	B2903-17	R	S	R	S	S	S
20	268	B2924-8	R	R	R?	S	R?	S
37	269	B2924-10	R	R	R	S	S	S

Progeny number in test	1952 field No.	Progeny	Late blight race					
			Iowa	B	C	D	BC	BD
21	272	B2935-7	R	R	S	S	S?	S
22	284	B2968-60	R	R	R	S	S	S
23	288	B2969-13	R	R	R	S	R?	S
10	289	B2969-15	R	S	R?	R	S	S
34	290	B2993-4	R	R	S	R?	S	S
24	298	B3006-15	R	R	R	R	R?	S
25	306	B3013-3	R	R	S	R?	R	S
61	V.T.	Kennebec	R	R	R	R?	R?	S
-	505	Cherokee *	R	R	R	R	S?	S*
55	-	Teton	S	S	S	S	S	S
54	180	41956	S	S	S	S	S	S
120	V.T.	Cobbler	S	S	S	S	S	S
48	-	Snowdrift	R	S	R	S	R	S
71	51295	S. Rybinii	S	D	S	-	D	S
100	-	Fendulari*	S	S	S	--	R	S
116	-	Fendulari I*	S	S	S	-	S	S

Results from two Iowa greenhouse tests March - May 1952 on all races except D. One test with D.

*One test only. V.T. Variety yield trial.

Late blight resistance in accessions of Solanum spp. from F. J. Stevenson, Iowa Greenhouse test May 1952.

Variety	U.S. number	Ac. No. Parentage	Iowa	B	C	B	BC	BD
106	25902	(Dem. x tuber) *	R	R	R	-	R	R
109	25894	(" x ") *	S	S	S	-	S	S
110	25917	(Polyd. x tuber)*	S	S	S	-	S	S
111	25892	(Demix. x tuber) *	Rf	R	RD	-	RD	S
112	25907	(dem. x tuber) *	R	R	R	-	Sd	R

Both probably resistant: Rf = Resistance with flecks
 RD = Resistance doubtful - sporulation absent
 Sd = Susceptible but no sporulation present

*Results of one test only.

IOWA

C. E. Peterson, W. J. Hooker, A. E. Schark,
Roland G. Timian, and Frank L. Blankenburg

Potato-breeding work in Iowa in 1952 included testing of varieties and selections for adaptability in observation plots and replicated trials, selection of new seedlings in the field, production of seed and seedlings in the greenhouse, developing methods and testing for disease resistance, production of disease-free stocks of new and advanced selections and distribution of seedling progenies and selections to potato workers in other States. The incidence of internal defects was determined for varieties and selections in replicated trials. Promising selections and new varieties were tested for chipping quality.

Distribution

New seedling tubers totaling 9,800 from the 1951 greenhouse crop were distributed to 5 States where this type of material was requested. Advanced selections totaling 80 lots, representing 28 clones, were distributed to 7 States in response to specific requests. For the regional testing program 8 selections for observation plots and 3 for replicated trials were distributed to each of the 8 cooperating States.

Seed and Seedling Production

In 1952, at Ames, 91 crosses were made among parents selected for good horticultural characters and resistance to disease. Most crosses involved resistance to both scab and late blight. Parents having resistance to virus X and to the virulent races of late blight were also used extensively. Some crosses were also made which involved resistance to leaf roll, virus A, virus Y, and ring rot. Conditions were good for seed production, and ample seed was produced for planting the seedling crop.

In the fall of 1952 approximately 15,000 seedlings were grown to maturity in 3-inch pots in the greenhouse. All but a few hundred of these were screened for resistance to common late blight before being transplanted from the seedling flats. The procedure for late blight screening was essentially the same as that described in previous reports. The technique for inoculating plants in seedling flats with the ring-spot strain of virus X has been improved and more or less standardized so that we were able to screen more than half of the seedling crop for virus-X immunity. Of the more than 15,000 greenhouse seedling tubers on hand for planting in the field in the spring of 1953, approximately 10,000 are expected to be immune to virus X. On the basis of previous experience over 90% of the total seedling crop will also be resistant to the common race of late blight. There are approximately 11,000 of the "B-size" tubers from greenhouse seedlings which will be distributed to cooperating States for planting in 1953.

Solanum Species

The emphasis in species hybrid production has been on determination of inter-specific crossability and the introduction of disease resistance into Solanum tuberosum. Ninety-one interspecific crosses were attempted in the fall of 1952; of this number 33 produced seed. Several progenies of crosses between different species and S. tuberosum were planted for backcrossing to parent selections. Included in this group were 5 demissum x tuberosum crosses made at Ames in 1951. Future crossability studies will include the use of hormones and stem girdling to prevent flower abscission and to increase seed set. Disease-resistance studies have been primarily directed at introducing late-blight resistance into S. tuberosum from a source other than S. demissum. Accordingly, 52 species and species hybrids were included in the test for late-blight resistance, using the 5 races of P. infestans identified by Peterson and Mills. In addition, selected clones of species reported to be resistant to scab, virus Y, and leaf roll are being tested. A few progenies of interspecific crosses have been screened in the seedling stage for resistance to the common race of late blight. More intense screening is planned for the coming year. The majority of the material used in these studies has been obtained as tubers or seed from the Sturgeon Bay Station, through the courtesy of Dr. R. W. Hougas.

Pre-planting Treatment of Seed

In order to induce more prompt and uniform germination, samples of recently extracted seed were placed on wet blotter paper in petri dishes and subjected to various combinations of temperature and time of treatment. It was found that the germination was more prompt and uniform following several of the treatments. The most successful were 15°-30° C., alternating (8 hrs. 15°-16 hrs. 30°) for 4 days and 20° C. constant temperature for 4 days. Chilling at 5° and 10° C. up to 6 days before moving the dishes to higher temperatures did not improve germination. In a typical case the maximum emergence of 56% was attained with treated seed (4 days at 15°-30° C) 8 days after sowing, whereas untreated seed planted on the same date showed 2% emergence on the eighth day. The untreated seed showed only 20% emergence on the twenty-fourth day after planting, and size of plants varied because emergence continued at least three weeks. While the greatest improvement in rate and uniformity was apparent with new seed, there was also better germination of old seed. One trial with year-old seed revealed 71% emergence on the tenth day after planting, compared with 15% for untreated seed. New seed extracted 7 weeks before the trial had an emergence of 23% on the tenth day if it was given 4 days of incubation before sowing at alternating 15° to 30° C. and no emergence when it was untreated. Apparently the incubation treatments made the newly extracted seed comparable to the year-old seed. Old seed was improved to such a degree that the practice of pre-planting incubation was adopted for all seed sown in 1952.

After the incubation period the seeds were removed from the blotter paper and spread out to dry on glazed paper. After the seed was sufficiently dry to handle easily it was sown in flats, which were then watered and covered with glass to prevent drying. After the seedling plants had emerged the covers were removed and flats were placed in a cold frame. After 2-3 weeks the plants were of a convenient size for the virus-X and late-blight inoculations. These methods produced good stands of uniform plants needed for effective seedling screening.

Field Plots

Approximately 16,000 new seedlings were grown in single hills at Clear Lake. These included 524 hills selected from Iowa material in 1951 by Dr. G. H. Rieman. There were also 812 hills from segregating lines that were secured at Chapman Farm by W. J. Hooker in the fall of 1951 and 1,900 of segregating lines from Iowa material grown in Wisconsin in 1951. The latter were included because the same segregating lines were lost in Iowa's 1951 flood. There were also approximately 500 hills grown from greenhouse seedling tubers produced by Dr. H. O. Werner at Nebraska. The remainder of the single hills were produced from seedling tubers grown in the greenhouse at Ames.

Observation plots at Clear Lake totaled 622, most of which were second- and third-year selections and selections secured from breeding programs in other States. Of the latter there were 198 selections that had been sent by workers in 12 States. Observation plots of 102 named American and foreign varieties were grown. Much of this material was planted in connection with the regional trials and for the North-Central Regional Conference, which was held in Iowa in August.

Seed-maintenance plots were again grown at Northwood, N. Dak., through the cooperation of Dr. W. G. Hoyman. This year the Northwood planting included 251 lots of seed. Most of these plots were only 2-3 tuber units in size. A few of the more promising advanced selections were increased to the extent of 20 to 100 tuber units. All of the tubers planted in the Northwood plots were indexed in the greenhouse before planting.

Yield Trials

Two yield trials were conducted on muck soil at Clear Lake and one on Mineral soil at Ames. The Clear Lake trials were planted May 7 and harvested September 23. Fertilizer was 0-9-27, applied at 700 pounds per acre. There were 5 replications of 25-hill plots in randomized blocks. Spacing was 12 inches in rows 36 inches apart. Sprays were applied at 10-day intervals, and although some late blight was present, no damage was done. The season was generally good for potato production, the only unusual feature being the higher than normal incidence of hollow heart, growth cracks, and internal necrosis. Iowa tables 1 and 2 show the performance of 22 selections and varieties.

Sebago yielded significantly more than any other variety in the trial and there were very few defects. In Iowa table 2 it will be noted that Sebago had an internal necrosis index of 7.3. However, in spite of this it was the outstanding variety tested in 1952. The performance of Sebago over a period of 4 years can be observed in Iowa table 5.

LaSoda, tested for the first time in Iowa, produced high yields but the tubers were deep-eyed and rough. Starch content was low and there was some severe scab. Because of the interest in red potatoes LaSoda seems worthy of further trial in Iowa. Another red that appeared promising in 1952 was P45-11-101, a selection from Mr. Ben Picha. The tubers of this selection were round and smooth, and, as shown in Iowa table 2, it was relatively free from external defects, the chief one being undersize and the only internal defect was about

Iowa table 1. Performance of some potato selections and varieties in trials conducted at Clear Lake, Iowa, 1952.

Variety	Maturity ^{1/}	Yield per acre			Scab ^{3/}	Starch ^{4/}	Remarks
		Total	U.S. No. 1 ^{2/}	Pct.			
		Bu.	Bu.	Pct.		Pct.	
Sebago	4+	827	782	94.5	1-2	13.0	Smooth skin, shallow eyes, good type.
LaSoda	3	839	653	77.8	1-4	10.9	Deep eyes, rough, deep scab, red.
Ph5-11-101	3	717	605	84.4	2-2	11.7	Good type, skin slightly netted, red.
Ontario	5	673	600	89.2	T-1	12.6	Good skin, no scab, note data on internal defects.
I44-16-1	3	630	577	91.6	1-1	13.0	" " " " "
X26-8	3	719	565	78.6	1-1	12.6	Flaky skin, high % undersize, red.
I803-3	2	570	518	90.9	1-1	12.8	Very good type & skin, res. to late blight & virus X.
I46-1-31	3	588	516	87.8	1-1	14.5	Good skin, some pointed tubers, note internal defects.
B 2368-10	3	829	506	60.9	2-2	11.5	Very severe growth cracks, red.
Cobbler	2	646	487	75.4	1-3	12.7	Irreg. shape, deep eyes, deep scab.
I803-1	2	551	482	87.5	1-1	11.9	Smooth, shallow eyes, flattened, res. to late blight.
Kennebec	4	664	475	71.5	1-3	12.8	Large, irreg. shape, deep scab.
I781-7	3	525	460	87.6	T-1	14.9	Good type, smooth, good skin, no scab
Seneca	4	632	504	79.8	1-2	12.6	Irreg. shape, deep eyes, flaky skin
R. Pontiac	3	744	449	60.3	1-3	10.6	Large, severe growth cracks, deep scab, red.
I8167-2	2	484	448	92.5	1-2	11.7	Rough skin, fair type, res. to late blight & virus X.
I872-4	3	473	440	93.0	1-2	12.4	Large tubers, low set, res. to late blight.
I8168-31	1	448	386	86.2	T-1	11.3	Small tubers, good type & skin, yellow flesh.
I811-1	1+	458	382	83.4	T-1	14.7	Good type & skin, res. to late blight and virus X.
Progress	3	685	369	53.9	2-4	13.9	Good color, very deep scab.
B 962-9	1	436	358	82.1	1-1	14.9	Small, flaky skin, res. to late blight.
B 920-7	1	403	336	83.4	1-2	12.1	Small, smooth skin, very early, res. to late blight.
L.S.D. P = .05		110	116			0.6	
P = .01		146	153			0.8	

1/ Maturity noted in five classes with class 2 corresponding to Cobbler maturity and Class 4 corresponding to Katahdin maturity. No. 1 is earlier than Cobbler. No. 5 is later than Katahdin.

2/ Undersize and external defects removed. Average of five replications.

3/ First figure indicates area: T = trace; 1 = 1-20% of area covered; 2 = 21-40% of area covered. Second figure indicates type of scab lesions: 1 = Surface

(continued on next page)

Iowa table 1 concluded.

russet type; 2 = Raised surface or shallow pit; 3 = Deep pit; 4 = Very deep-pitted scab.

4/ Starch percentage determined from specific gravity readings, mean of four replications.

8% hollow heart. Its starch content of 11.7% places it somewhat above Pontiac but not up to Cobbler in quality. The red color is partially obscured by a netting that gives some tubers a brownish appearance. It was also a top yielder among the entries in the regional trial (Iowa tables 3 and 4).

Ontario produced a good crop but 38% of the tubers showed internal necrosis. Iowa 44-16-1 has been among the most promising of the scab-resistant selections for several years (see Iowa table 5). In 1952 30% of the tubers showed internal necrosis and the index value 15.6 (Iowa table 2) indicates that this defect might be serious even though it is considerably below that for Ontario. X26-8 has produced good yields and good quality in trials over a period of years. It produces a high percentage of undersize, as is shown in Iowa table 2.

I803-3 was one of the outstanding selections in appearance. Because it combines good cooking quality and earliness with resistance to scab, late blight, and virus X, it seems worthy of more extensive trial. The yield was not significantly different from that of Cobbler but of the tubers that graded US #1 on external appearance 95% were free of internal defects compared with only 76% for Cobbler (Iowa table 2).

Kennebec and Pontiac are normally high yielders but because of grade defects, principally growth cracks (see Iowa table 2) in 1952, the yields of US #1 for these varieties were rather low. Progress also gave a high total yield but mainly because of severe scab it graded only 54% US #1.

Iowa tables 3 and 4 show the results of the regional yield trials. These same entries were included in trials in 8 States in the North-Central Region and their performance will be summarized in a separate report.

Yields and specific gravity of seven selections and varieties that have been in the Iowa trials for 4 years are shown in Iowa table 5. It is apparent from this table that one cannot draw reliable conclusions with regard to yield until a selection has been tried several years at a given location. Significant differences in yield were found every year but when yields for the 4 years are averaged the differences between varieties are not significant. Note how the position of varieties changes from year to year. Sebago was the lowest variety in 1948 and highest in 1952. Kennebec was the top variety of the seven in 1948 and lowest in 1952. Cherokee likewise shifted from last in 1949 to top place in 1950.

Iowa table 2. Summary of grade defects.

Variety or selection	External defects 1/				Internal defects 2/			
	: Undersize	: Scab	: Growth: cracks	: Second: growth	: Total external	: Hollow: heart	: Internal: necrosis	: Vascular: Discoloration
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	: index 4/	: tubers
Sebago	3.5	0.1	0.4	0.0	1.5	0	7.3	1
LaSoda	3.8	9.1	3.3	3.7	2.3	0	.7	0
P45-11-101	9.8	1.1	4.1	.0	.6	8	.0	0
Ontario	5.4	1.0	0.3	4.1	.0	1	25.6	0
I44-16-1	6.5	.0	1.0	.0	.8	1	15.6	0
X26-8	19.5	.0	1.2	.1	.7	0	1.7	0
I803-3	6.5	.0	1.3	.4	.8	1	1.0	4
I46-1-31	4.7	.0	2.8	1.6	3.0	4	15.0	0
B 2368-10	4.8	4.6	27.6	.7	1.4	2	.0	1
Seneca	4.9	.0	10.8	1.3	3.2	0	8.3	3
Cobbler	8.2	5.4	.9	9.4	.6	18	.3	6
I803-1	3.9	.0	7.4	.6	.6	4	.3	0
Kennebec	3.3	1.2	14.2	5.4	4.2	5	.0	0
I781-7	11.2	.0	.0	.8	.4	0	.0	1
R. Pontiac	3.8	5.7	29.0	.9	Trace	2	.3	4
I8167-2	3.8	.8	.3	.6	2.0	16	.0	0
I872-4	3.4	.0	1.4	.8	1.2	2	.0	0
I8168-31	12.5	.5	.7	.0	.0	0	.7	0
I811-1	14.0	.0	.5	.8	1.3	0	21.0	4
Progress	5.9	35.7	3.2	.8	.4	0	1.7	0
B 962-9	15.9	.8	.9	.3	.0	27	.0	1
B 920-7	12.2	.0	3.7	.2	.5	0	3.0	14

1/ Mean of five replications expressed in percent by weight.

2/ Internal defects based on five 20-tuber samples. Samples for cutting were drawn from tubers that graded U.S. No. 1 on external appearance.

3/ Total number in 100-tuber sample that showed no internal defects. Some tubers had more than one type of internal defect.

4/ 0 = All tubers free of internal necrosis; 100 = All tubers with severe internal necrosis.

Iowa table 3. Performance of varieties and selections in regional yield trial, Clear Lake, Iowa, 1952.

Variety or selection	Maturity ^{1/}	Yield per acre			Scab ^{3/}	Starch ^{4/}	Chip ^{5/} color
		Total	U.S. No. 1 ^{2/}				
		Bu.	Bu.	Pct.		Pct.	
ND 45-11-101	3	741	658	89	1-2	11.5	3.0
Ia. X26-8	3	799	658	82	1-1	12.6	3.2
Wisc. 303-40	5	707	598	85	2-2	12.6	2.3
Wisc. K5	4	756	597	79	2-4	10.9	3.5
Ia. 6316	3	636	597	94	T-1	13.6	2.7
Mich. 1363	2	647	578	89	1-2	11.3	3.0
ND 457	3	667	550	82	1-2	13.2	3.0
Ia. Cherokee	3	630	547	87	1-1	13.2	3.0
Min. 15.46	3	776	525	68	1-4	12.8	3.0
Mich. B 505-3	4	763	510	67	2-2	10.9	3.0
Ck. Cobbler	2	667	508	76	2-3	12.6	3.0
Ck. Katahdin	4	669	496	74	1-3	11.3	3.0
Mich. 46-9	4	552	466	84	1-2	12.4	3.0
Wisc. M-804	4	510	460	90	1-1	12.8	2.3
Neb. 20.44-2	2	498	421	85	1-3	10.4	2.3
Min. 113-8	2	443	401	91	1-2	9.8	2.8
Neb. 20.42	2	518	397	77	1-3	12.1	2.5
Wisc. 1301	3	478	389	81	2-3	13.0	3.5
Neb. 59.41	2	470	336	71	2-1	13.4	2.3
Ck. Triumph	2	420	281	67	2-3	11.3	3.2
ND B 515-2	1	384	239	62	T-1	9.6	4.0
Neb. 89.46	2	238	220	92	1-2	11.9	2.3
L.S.D. P = .05		106	107			0.7	
P = .01		140	142			1.0	

1, 2, 3, 4/ See footnotes for table 1.

5/ 1 = Very light; 4 = very dark; Russet Rural check was 2.2. Chipped after 6 weeks at 40°F. and 2 weeks at 75°-80°F. See table 8.

Iowa table 4. Regional yield trials, Clear Lake, Iowa, 1952. Summary of grade defects.

Variety or selection	External defects 1/				Internal defects 2/			
	: Undersize	: Scab	: Growth : cracks	: Second : growth	: Sunburn	: Total : External	: Heart : necrosis	: Vascular : discoloration
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
ND 45-11-101	9.3	0.0	0.8	0.5	0.3	10.9	1.7	3
Ia. X26-8	15.3	.1	.0	1.5	.7	17.6	.7	0
Wis. 303-40	6.6	2.1	5.7	0.4	.6	15.4	1.3	2
Wis. K5	4.9	7.2	2.1	.2	2.5	16.9	.7	1
Ia. 6316	3.0	.0	.3	.1	2.5	5.9	.0	3
Mich. 1363	5.1	.0	3.0	0.9	1.6	10.6	1.7	2
ND 457	5.9	.1	10.0	0.9	.6	17.5	20.6	4
Ia. Cherokee	4.5	.0	4.6	3.6	.7	13.4	.7	2
Min. 15.46	3.9	13.9	.9	.2	6.5	25.4	.3	1
Mich. B 505-3	4.4	1.0	25.2	.9	1.6	33.1	4.7	11
Ck. Cobbler	10.3	6.8	.4	5.8	.7	24.0	2.0	7
Ck. Katahdin	6.4	1.9	12.2	1.6	3.7	25.8	6.0	1
Mich. 46-9	9.0	Trace	1.9	3.2	1.4	15.6	16.6	1
Wisc. M804	6.3	.0	2.8	.0	.7	9.8	39.0	2
Neb. 20.44-2	10.0	4.0	.9	.6	.0	15.5	4.0	1
Min. 113-8	4.6	.0	4.1	.0	.5	9.2	2.3	11
Neb. 20.42	6.1	3.0	13.9	.0	.1	23.1	.7	1
Wis. 1301	12.2	5.5	.5	.6	.0	18.8	1.0	4
Ck. Triumph	9.0	16.6	6.4	.9	.0	33.9	.0	0
ND B 515-2	4.4	.0	33.5	.0	.0	37.9	.0	1
Neb. 89.46	4.5	.4	1.8	.9	.0	7.6	4.8	3
Neb. 59.41	8.7	.0	.3	18.1	1.2	28.3	1.8	7

1, 2, 3, 4/ See footnotes on table 2.

Iowa table 5. Yield per acre of U.S. No. 1 potatoes and specific gravity of four varieties and three selections tested 4 years in Iowa.

Variety or selection	Year, yield per acre, and specific gravity								Mean	
	1948		1949		1950		1952			
	Yield	Sp. G.	Yield	Sp. G.	Yield	Sp. G.	Yield	Sp. G.	Yield	Sp. G.
	Bu.		Bu.		Bu.		Bu.		Bu.	
Ia. 44-16-1	511	1.072	550	1.072	636	1.076	577	1.076	568	1.074
Kennebec	631	1.072	544	1.067	597	1.074	475	1.075	562	1.072
Cherokee	547	1.078	447	1.073	704	1.075	547	1.077	561	1.076
Sebago	374	1.070	511	1.070	501	1.075	782	1.076	542	1.073
6316	449	1.068	482	1.066	512	1.074	597	1.079	510	1.072
X 26-8	415	1.076	496	1.069	501	1.073	565	1.074	494	1.073
Cobbler	481	1.072	486	1.065	415	1.069	487	1.075	467	1.070
Means	487	1.073	502	1.069	552	1.074	576	1.076		
LSD P= .05	79	.004	69	.003	81	.005	116	.003	N.S.	N.S.

Yield Trial at Ames

Potato acreage in Iowa has declined from more than 50,000 acres in 1940 to about 10,000 in 1950. Commercial acreage of potatoes has remained almost constant at about 2,500 during that period so the decline has taken place in potatoes planted in farm and home gardens. Approximately three-fourths of Iowa's potato acreage is still produced by farmers and gardeners who are not in the potato business so there is some interest in varieties for their purposes. Because of this interest 13 varieties and selections were planted in a yield trial at Ames.

None of the new varieties or selections included produced significantly higher than Cobbler or Triumph. Cherokee produced a high percentage of second-growth and rough tubers. Ia. 44-16-1 was the only entry that showed internal necrosis (Index value 20.8) and 6316 produced 60% hollow heart. The soil at Ames, where this trial was planted, is not good for potato production and none of the entries produced a crop that could be considered satisfactory in quality and appearance. The data for the Ames trial are presented in Iowa table 6.

Virus X

Approximately two-thirds of the entire seedling crop was screened for resistance to virus X. The type of resistance involved was that derived from seedling 41956.

Progenies segregating for immunity to virus X were inoculated before transplanting from the seedling plot using a De Vilbiss paint spray gun with a converted CO₂ fire extinguisher as a source of pressure. Seedlings showing no symptoms were transplanted to the bench and after 3 weeks were inoculated by rubbing leaves of individual plants with sap from X-infected Nicotina glutionsa. Only a small percentage of susceptible plants were found to have escaped the first inoculation.

Approximately 200 clones from a progeny segregating for X immunity were tested for X susceptibility, using the methods described above as well as that of Schultz in which an X-carrying scion was grafted to a stock of the clone to be tested. Results using these two methods were in good agreement. Immune clones gave no reaction following inoculation with the virulent ring-spot strain of virus X^{1/} whereas susceptible clones expressed symptoms of virus X either as local lesions or as systemic mottle.

Several isolates of virus X were compared in virulence on seedling plants of progenies segregating for X immunity. Some were equally virulent to the virulent ring-spot strain of virus X, whereas others were very mild and not suitable for use in testing immunity of seedling plants.

^{1/} The writers are indebted to Dr. R. H. Larson of the University of Wisconsin for use of his culture of the virulent ring-spot strain of virus X.

Iowa table 6. Potato yield trial, Ames, Iowa, 1952.

Variety or selection	Maturity	Yield per acre			Scab ^{3/}	Starch ^{4/}	Remarks
		Total	U.S. No. 1 ^{2/}	Pct.			
		Bu.	Bu.	Pct.			
X26-8	3	569	384	67	1-2	12.6	Many undersize
Cobbler	2	512	367	72	1-4	13.4	Rough and knobby
Triumph	2	553	366	66	1-4	12.4	Fair color, deep scab, some harvest cracks.
Satapa	3	552	353	64	1-4	11.1	Severe growth cracks
Kennebec	4	560	350	62	1-4	12.8	Large, misshapen, some growth cracks
Chisago	3	531	340	64	1-4	12.4	Severe scab, very knobby.
6316	3	399	339	85	1-1	11.7	Hollow heart 60%, good shape, no scab, no growth cracks.
I44-16-1	4	429	328	76	1-1	13.0	Internal necrosis index 20.8, best looking skin, good shape, no knobs or growth cracks.
Waseca	2	451	293	65	2-4	10.9	Very severe scab.
Red Warba	1	492	265	54	1-3	13.2	Severe growth cracks, misshapen tubers.
Sebago	4	294	240	82	1-2	13.0	Large tubers, light set, few growth cracks.
Cherokee	3	580	204	35	1-1	14.1	Very rough, severe second growth, growth cracks.
B 920-7	1	318	138	43	1-2	11.9	Very small, severe growth cracks, & second growth.
L.S.D. .05		79	69			1.0	
.01		106	92			1.4	

1, 2, 3, 4/ See footnotes for Iowa table 1.

Late blight

Virtually all progenies grown for greenhouse planting had at least some late blight resistance in the parentage. Seedlings were exposed to infection in the flat before transplanting. This was done 2 to 3 days after the first inoculation with virus X. Inoculum of Phytophthora infestans were collected from newly infected excised leaves that had previously been inoculated and maintained in moist chambers. Infection of seedling plants was much more rapid and uniform than in previous years.

All clones used in the breeding program were tested for resistance to a number of races of P. infestans.² Excised leaves were exposed to infection and maintained in moist chambers. Satisfactory differential reactions were obtained within a week to 10 days. Approximately 115 clones were tested against five races of the late-blight fungus. Similar results were obtained in two trials. Reaction of certain clones exhibiting rather high resistance are shown in Iowa table 7.

Certain differential clones are being maintained virus-free with the other parent stocks and are available to others for use in maintaining differentials for P. infestans races.

Virus Y

Seedling plants were inoculated with two strains of virus Y obtained from Dr. R. H. Larson. Approximately 40 progenies³ segregating for Y resistance were mechanically inoculated and the severity of infection noted. Tubers from all plants will be planted in the field for further observation. Inoculation with virus Y will also be made using viruliferous aphids under large cages in the field.

Seedlings of selfed ND 457 were exposed to inoculum from a number of Y isolates. Symptomless survivors are being maintained for further inoculation. Seedlings from the same selfed lines were grown in flats, and a number of Y isolates were compared for virulence. Certain isolates were much more virulent than others.

Leaf Roll

During the past 4 years a number of crosses have been made with parent clones having field resistance to leaf roll. Testing of resistance in these progenies have been awaiting collection of leaf-roll inoculum and development of techniques. Currently several isolates of leaf roll are being maintained on Datura

2/ The writers are indebted to L. C. Peterson and W. R. Mills for use of certain races of P. infestans.

3/ Some of these progenies were Solanum species obtained from Dr. R. W. Hougas. Inter-regional Potato Introduction and Preservation Station, Sturgeon Bay, Wisconsin.

Iowa table 7. Resistance of certain clones to races of P. infestans.

Pedigree No.	Late Blight Race				
	A	B	C	BC	BD
I803-1	R	-	R	R	S
I803-3	R	R	R	R	S
I870-1	R	R	R	R	S
I957-1	R	R	-	R	S
S.dem. x Min. 113.43-1 ^{1/}	R	R	R	R	S
" x 6316 ^{1/}	R	R	R	R	R
PI 161181 x 6316 ^{1/}	R	R	R	R	R
B 595-76	R	R	R	R	S
B 606-67	R	R	R	R	S
B 922-3	R	R	S	S	R
B 922-6	R	R	R	R	R
B 922-12	R	R	S	S	R
Cherokee ^{1/}	R	R	R	S	S
PI 188667 ^{2/}	R	R	R	R	R
PI 188668	-	R	S	S	R
PI 184764	R	R	R	R	R
PI 188662	R	R	R	R	R

^{1/} Results of one test only.

^{2/} PI numbers are from R. W. Hougas of the Inter-Regional Potato Introduction and Preservation Station, Sturgeon Bay, Wis.

and a supply of leaf-roll-infected 41956 has been built up for use in field testing. Seedling plants will be exposed to viruliferous aphids in the greenhouse and field under cages. Resistance will be evaluated following aphid inoculation and inoculation by grafts.

Chipping Trials

Samples of tubers from replicated trials and observation plots were stored 9 weeks at 40°F. then conditioned at 75° - 80° F. for 14 days before chipping. Russet Rural, the check variety, was chipped at intervals during the conditioning period, and all samples were chipped when Russet Rural had undergone sufficient conditioning to make a satisfactory chip. Processing was done in a commercial plant^{4/} with an automatic machine during the regular run.

Samples were classified into four color grades with class 1 being very light, class 2 light golden brown, class 3 dark but still marketable, and class 4 dark. All samples were classified twice by each of three judges, and the means are shown in Iowa table 8. The Russet Rural check samples were processed at intervals along with other samples. It will be noted in Iowa table 8 that

^{4/} The assistance of the Hiland Potato Chip Co. and ^{of} their Des Moines plant manager, Mr. J. W. White, is gratefully acknowledged.

Russet Rural averaged a little higher than grade 2, indicating good quality chips with only an occasional sample falling into class 3. Any entry having a color rating equal to or lower than 2.5 would be considered a good chipping variety under the conditions of this test. Of the entries in the Iowa yield trial, Kennebec and Ia. 44-16-1 were superior to Russet Rural in color.

Iowa table 8. Color rating of selections and varieties in chipping trial 1952.

Name or pedigree No.	Color rating	Name or pedigree no.	Color rating	Name or pedigree No.	Color rating
Rus. Rural (ck)	2.2	B 2887-2	3.0	Min. 42	3.0
I801-10	3.0	B 2920-13	3.0	American Giant	3.0
I907-2	3.5	B 2924-2	3.0	Aquilla #5	1.3
I957-1	2.8	B 2924-8	3.0	Blue Victor	2.2
I8116-1	3.0	B 920-7	3.0	Graigs Royal	2.2
I8116-2	3.0	X 927-3	3.5	Craigs Snow White	3.0
I8119-2	3.0	Minn. 113-46-20	2.8	Columbia Russet	3.2
I8119-4	3.0	Rus. Rural (ck)	2.3	Early Ohio	3.2
I961-1	3.0	6316	2.3	Epicure x Rybinii	
I976-2	3.0	Calrose	2.2	X Katahdin	1.0
I976-3	3.0	Canus	3.0	Garnet Chili	2.2
I803-3	2.2	Cayuga	1.2	Ostbote	2.5
I811-1	1.0	Chenango	2.5	Rus. Rural (ck)	2.3
I870-1	4.0	Cherokee	3.0		
I872-4	3.0	Chippewa	2.2	Iowa Yield Trial Entries	
I8140-1	2.0	Chisago	3.3	I781-7	2.2
I8167-1	2.5	Earlaine	3.5	I803-1	3.2
I8167-2	1.8	Erie	3.0	I803-3	2.8
I8168-1	4.0	Essex	3.0	I811-1	3.0
I8168-15	2.0	Golden	3.2	I872-4	2.5
I8168-20	3.0	Houma	3.0	I8167-2	2.5
I8168-26	3.0	Kasota	3.0	I8168-31	2.3
I8168-28	3.0	La Salle	2.0	I44-16-1	1.2
I8168-30	3.0	Marygold	3.2	I46-1-31	3.0
I8169-8	3.0	Menominee	2.0	B 920-7	3.0
I44-16-1	1.7	New White	3.0	B 962-9	3.0
I1050-2	3.3	Norkota	2.5	B 2368-10	3.3
I1077-3	2.5	Pawnee	2.0	X 26-8	3.3
I1077-4	2.8	Potomac	3.0	P 45-11-101	3.0
I1077-14	2.7	Rural New Yorker	1.7	Cobbler	3.2
I1077-15	2.2	Rus. Rural (ck)	2.2	Kennebec	1.3
I1077-16	3.0	Saranac	2.8	La Soda	3.0
I1087-1	3.0	Satapa	1.8	Ontario	2.0
B 2847-Ia-5	2.5	Seneca	3.2	Progress	2.8
B 2368-10	3.7	Snowdrift	2.0	Red Pontiac	4.0
B 904-6	3.0	Teton	3.0	Sebago	2.5
B 962-9	2.7	Triumph	3.5	Seneca	2.2
B 2162-49	2.0	Waseca	4.0	Rus. Rural (ck)	2.2
B 2368-4	3.8	White Cloud	3.0		
B 2861-1	2.7	White Rose	2.2		

KANSAS
E. W. Davis

Twenty-two varieties were tested for yield at Manhattan, Kansas during 1952. The results of this test are given in Kansas table 1. Observation trials were made on 21 varieties. The data are given in Kansas table 2.

Kansas table 1. Yield of 22 varieties at Manhattan, Kansas, 1952.

Variety	Yield per plot U.S. No. 1	
	Lbs.	Pct.
White Cloud	29.25	82.6
Red Warba	23.75	79.6
Cobbler	21.88	75.2
K-5	16.56	64.8
B 73-10	13.44	75.7
Pungo	13.19	69.3
B 447-95	12.50	62.2
B 606-67	12.44	59.5
Cherokee	11.56	64.4
20-44-2NC	11.50	54.3
6313	11.38	64.3
Kennebec	10.56	61.6
B 355-44	10.56	74.3
20-42-9-NC	10.19	55.9
89-46-2NC	8.31	72.6
1301	7.75	51.8
X-26-8	7.38	44.8
59-41-P1	5.31	33.8
M-804	5.31	50.8
303-40	2.50	36.6
13	0.38	0.0
B 505-2	0.00	0.0
L.S.D. 5% level	4.66	
L.S.D. 1% level	6.20	
L.S.D. 0.1% level	8.06	

Kansas table 2. Observation trials, Manhattan, Kansas, 1952

Entry	Stand hills	Tuber matur- ity	Total yield per plot	U.S. No. 1 (over 1/8") per plot	U.S. No. 1	Scab read- ing	Vine 1/ matur- ity	2/ Sprouting
	No.		Lb.	Lb.	Pct	Type		
North Dakota								
N1255-1	10	1	14.50	12.50	86.2	Free	1	1
Fargo Sta. <u>3/</u>	9	1	9.00	7.00	77.8	"	1	2
ND-4511-101	14	3	12.00	6.00	50.0	3.5	3	2
Nebraska								
209-43-1	10	2	17.50	14.50	82.9	2.3	2	2
2644-1	10	3	12.00	9.00	75.0	2.9	2	4
213-43-2	10	2	7.00	3.25	46.4	1.8	1	2
213-43-3	10	2	10.00	7.25	72.5	0.6	1	2
140-42-1	10	3	4.25	1.00	23.5	1.0	2	3
204-43-1	10	1	7.00	4.25	60.7	3.0	2	3
32-39-3	10	2	8.25	6.50	78.8	0.8	1	1
4341-1	10	1	14.00	12.00	85.7	Free	1	1
Iowa								
13 2368-10	10	3	9.75	5.00	51.3	3.3	2	3
B 2847-Ia. 1	10	3	9.75	6.00	61.5	2.7	2	2
I 46-1-31	11	2	10.00	6.00	60.0	3.0	2	2
I 811-1	9	1	4.00	1.75	43.8	0.7	1	2
I 976-3	11	2	9.25	4.25	45.9	2.5	3	1
I 872-4	12	2	6.50	5.00	76.9	2.7	2	1
I 8168-31	10	1	7.50	3.25	43.3	2.3	1	1
I 8168-26	12	1	9.00	7.25	80.6	2.9	1	1
Louisiana								
LaSota	10	2	9.75	8.75	89.7	1.2	2	2
LD 81-64	9	2	3.25	2.00	61.5	2.2	2	2

1/ Scale 1 to 5; Cobbler as 2, Katahdin as 4.

2/ Scale 1 to 5; 1 as none, 5 as many.

3/ Probably 21X.

LOUISIANA

Julian G. Miller and Raymon E. Webb^{1/}

Breeding methods, location of breeding plots, and objectives were outlined in the 1951 National Potato-Breeding Report. During the fall of 1951, approximately 15,000 seedlings were grown in the greenhouse. These tubers and the advanced lines were planted in South Dakota for increase and selection. The growing season was very dry. Only 8 inches of rain was recorded in the plot area for the entire growing season, yet the seedlings performed well, and 417 selections were made at harvest. One hundred sixty-two seedlings produced tubers with a deep red color. Many of these seedlings will, no doubt, add to the present supply of parental material that produces red tubers. Fertility in these red lines under southern conditions will provide a greater opportunity to incorporate blight, scab, and virus disease resistance with red tuber color.

Growing conditions in Louisiana during the past spring were almost ideal for potato production. Dry weather prevailed during the harvest period, which arrested minor outbreaks of late blight and afforded the growers an opportunity to ship a quality pack.

Varietal trials were conducted at six locations in Louisiana this year of which only three are reported (La. table 1). La Soda gave greater yields than all other varieties and seedlings tested at all locations. These yields, however, were not significantly greater than LD 81-99 and LD 82-269 at Baton Rouge or LD 82-269 at Hammond. The two above-mentioned seedlings show considerable promise both in yield and quality of tubers. LD 81-99 is white, is medium late in maturity, produces a smooth tuber high in specific gravity, has excellent cooking quality, and makes superior chips. LD 82-269 is red, is medium in maturity, has very high dry matter, and produces an excellent chip.

De Soto and Triumph yielded similarly at most locations tested with the exception of New Roads. De Soto sets a large number of tubers that do not attain No. 1 size and will not be generally recommended in the State.

Kennebec did not yield as expected but the tubers were of an excellent grade and gave a superior chip.

Some interest has been expressed in Pungo, and it will be given extensive trials next season.

A compilation of the data of varietal trials over a 4-year period (La. table 2) shows that La Soda has consistently given the greater yields. This variety is being widely grown in the State, and the acreage will increase as sufficient certified seed becomes available.

^{1/} In co-operation with Dr. T. P. Dykstra of the U.S. Department of Agriculture and the National Potato Breeding Program.

The data of the advanced seedling trials in Louisiana and South Dakota are given in Ia. table 3. Several of these lines show considerable promise and will be given more extensive trials in the main potato-producing area. Several of the lines surviving the blight epidemic in South Dakota are being retested under greenhouse conditions.

Ia. table 4 gives the specific gravity, dry matter content, and chip quality of some varieties and advanced seedlings. The chip ratings were made in comparison with Kennebec after a 30-day storage period at 60° F. The chipping tests will be expanded to include reconditioning periods after various lengths of storage at 40°F.

Ia. table 1. Potato variety trials at three locations in Louisiana, 1952.

Variety	Location and average yield per acre		
	Baton Rouge	New Roads	Hammond
	Planted 1/21	1/25	1/25
	Harvested 5/8	5/9	5/6
	Bu.	Bu.	Bu.
La Soda	296	285	214
De Soto	235	233	171
Triumph	241	119	181
Kennebec	247		
Pungo	229	227	
73-10	232		136
LD 81-99	281	172	
LD 82-257	221		
LD 82-269	271	198	189
L.S.D. 5%	32.5	33.7	40.9
L.S.D. 1%	43.6	46.0	56.3

Fertilizer: 800 lbs. 4-12-4 plus 200 lbs. NaNO₃
 Plots: 40-ft. replicates; 5 replications.

La. table 2. Combined results of 5 potato varieties in yield trials for 4 years at seven locations in Louisiana.

Variety	Location and average yield per acre							
	Diamond 4-yr/ave	Thibadoux 2-yr/ave	Baton Rouge 4-yr/ave	Hammond 4-yr/ave	New Roads 3-yr/ave	Chase 2-yr/ave	Calhoun 4-yr/ave	State wide ave.
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
La Soda	173	140	208	176	266	140	150	182
De Soto	136	153	200	147	249	86	129	165
Katahdin	146 ^{1/}	168	142 ^{1/}	152	259 ^{2/}		81 ^{1/}	149
Triumph	152 ^{3/}	94	137	167	144	48 ^{2/}	108	132
Kennebec	143 ^{3/}	171	202	135 ^{1/}	229 ^{1/}	94 ^{2/}	104	167

1/ 2-year Average 2/ 1-year average 3/ 3-year average
Fertilizer: La. table 1; Plots: La. table 1.

La. table 3. Preliminary yield trials of advance potato lines in Louisiana and South Dakota, 1952.

Variety	Parentage	Location and yield U.S. #1 per A	
		Louisiana	South Dakota
		Bu.	Bu.
La Soda	Triumph x Katahdin	352	218
Triumph		241	123
Kennebec		222	188
LD 81-64	(CxT ₃ -1) x 1153	114	144
81-79	Green Mt. x Cayuga	128	135
81-88	Chippewa x B 76-23	202	108
81-99	Green Mt. x B 76-43	281	181
81-113	B 76-23 x Katahdin	309	172
81-115	" x "	225	190
81-122	" x "	304	176
81-197	" x B 61-3	264	169
82-94	X 590-7 x Cayuga	270	177
82-257	(Pontiac x Tri) x 56-1	221	213
83-274	47156 x	279	139
91-10	Katahdin x X494-1	326	159
91-88	B 61-3 x	377	210
91-143	Katahdin x B 61-3	305	176
91-258	Green Mt. x Katahdin	185	224
91-271	586 x L113	220	176
92-23	L113 x 465	296	184
92-105	(Ch x T ₃ -1) x La Mex.	207	183
92-114	L113 x 165	275	185
92-214	L113 x La Soda	203	196
92-216	" x "	158	152
92-217	" x "	202	160
92-218	" x "	200	154
92-223	B 61-3 x La Mex.	153	140
L.S.D. 5%		115	33
L.S.D. 1%		125	43

La. table 4. Quality of some potato varieties and seedlings grown in Louisiana, 1952

Seedling	Specific gravity	Dry weight Pct.	Chipping quality
La Soda	1.065	18.1	Excellent
Triumph	1.063	17.9	Poor
Kennebec	1.066	16.9	Superior
LD 81-64	1.056	14.6	Excellent
81-79	1.076	19.2	Superior
81-88	1.064	17.3	Good
81-99	1.062	16.8	Superior
81-113	1.069	19.2	Excellent
81-115	1.070	17.5	Superior
81-122	1.072	18.8	"
81-197	1.078	17.7	Good
82-94	1.075	18.7	Excellent
82-257	1.070	18.3	Good
82-269	1.074	19.0	Excellent
83-274	1.077	20.2	"
91-10	1.065	17.7	Fair
91-88	1.057	14.8	"
91-143	1.076	18.1	"
91-258	1.075	19.4	Excellent
91-271	1.053	14.8	Fair
92-23	1.064	17.6	"
92-105	1.075	18.3	Excellent
92-214	1.069	16.8	Fair
92-216	1.072	17.0	"
92-217	1.062	16.3	Good
92-218	1.071	18.8	Poor

MAINE

Reiner Bonde, Donald Merriam, and Robert Akeley

Breeding for Ring-Rot Resistance -- 1951

Approximately 634 selected seedlings, the progenies of resistant parents, were tested for ring-rot resistance in 1951. Forty-three of these seedlings, listed in Bonde et al. table 1, were found to be highly resistant and contracted none or only a trace of the disease as a result of the inoculations.

It is noteworthy that all of these newly selected seedlings produced fair to excellent tuber type besides being resistant to the disease. In addition, a number of seedlings are resistant to late blight, potato scab, leaf roll, or one of the mosaic diseases.

The ring-rot resistant selections will be tested again in 1952 before/increased being for further tests and for inclusion in the State wide variety tests.

Reaction of Progenies to Ring-rot Infection

Bonde et al. table 2 gives the percentage of infection according to six classes for the different progenies included in the experiment.

It is apparent from the data that certain crosses produce relatively high percentage of resistant seedlings and that others produce none or few. The data show which crosses included in the test are most desirable for the development of ring-rot-resistant varieties.

It is significant that very few of the seedlings produced by these crosses are extremely late maturing or have undesirable foliage and tuber characters. This shows marked improvement over the progenies of a few years ago when most of the crosses produced seedlings having poor tubers and plant characters.

Reaction of Miscellaneous Seedlings and Varieties Used in
Breeding Program

Bonde et al. table 3 gives the pedigrees, parentage, and reaction to ring rot, according to 5 classes of infection, of 142 selected seedlings used in the National Potato-Breeding Program.

None of the seedlings listed in Bonde et al. table 3 are highly resistant to ring rot. Ninety-nine were in classes 4 and 5 and considered to be very susceptible to infection. The 43 remaining were in classes 1 to 3 and possess some resistance to infection.

Although the seedlings listed in Bonde et al. table 3 were susceptible to ring rot, they possess resistance to one or more of the major potato diseases and are valuable as breeding material in the Potato-Improvement Program. Bonde et al. table 1 lists the selected seedlings that appeared to be highly resistant to ring-rot infection.

Bonde et al table 1. Pedigree and parentage of ring-rot resistant seedlings selected in 1951.

Pedigree	Parentage	Degree infection 1/	
		None	Trace
B 355-24	96-56 x Saranac		x
B 385-5	B 107-a x (X528-170)	x	
B 395-5	(X245-39) x (X528-170)		x
B 395-13	" x "	x	
B 399-1	(X499-a) x B 38-18		x
B 446-8	(X96-44) x Saranac	x ^{2/}	
B 446-25	" x "	x ^{2/}	
B 446-54	" x "	x ^{2/3/}	
B 607-56	B 83-9 x Teton	x ^{3/}	
B 607-72	" x "	x ^{3/}	
B 608-66	" x 46952		x ^{2/}
B 638-16	Teton x "	x ^{2/}	
B 721-1	Earlaine x Teton		x
B 721-35	" x "		x
B 725-8	(X336-184) x "	x	
B 766-1	(X157-9) x "	x	
B 766-45	" x "	x	
B 780-27	(X792-96) x "	x	
B 874-24	(X247-44) x Cherokee	x ^{2/}	
B 911-31	055 x Teton	x ^{2/}	
B 913-13	" x B 355-24	x	
B 915-2	B 231-3 x B 355-24		x
B 919-2	B 355-24 x (X792-94)	x	
B 922-3	TI5 x B 355-24		x
B 922-5	" x "	x	
B 922-8	" x "	x	
B 922-21	" x "		x
B 924-2	46952 x "	x ^{3/}	
B 930-11	Teton x (X792-94)	x	
B 931-2	B 355-24 x "	x	
B 982-8	Chippewa x "		x
B 2073-11	Empire x (X157-9)	x ^{4/}	
B 2130-1	B 56-1 x B 580-20		x
B 127-97	Katahdin selfed		x ^{2/}
B 738-8	" x Cherokee		x ^{2/3/}
B 738-8	" x "	x	
B 2441-17	Ackersegen x Flava		x
B 2441-22	" x "		x
B 2442-22	Calrose x "		x
B 2442-37	" x "		x
B 2444-66	" x "		x
B 1214-13	Flava selfed		x

1/ Five seed pieces of each variety inoculated by dipping in heavy suspension of bacteria in water.

2/ Tubers especially attractive in appearance.

3/ Plants early maturing. 4/ Russet skin.

Bonde et al. table 2. Reaction of progenies according to five classes of ring-rot infection. 1951

Pedigree number	Parentage	Selections in progeny <u>1/</u>	Selections infected in each class <u>2/</u>				
			0	1	2	3	4 5
		No.	No.	No.	No.	No.	No.
Katahdin Controls		121	0	1	4	20	43 53
B 2837-1	B 355-24 x B 434-57	12	4	0	1	1	2 4
B 2846-1	Teton x B 446-8	11	3	3	3	1	0 1
B 2847-1	" x B 962-32	16	4	2	2	3	1 4
B 2849-1	B 459-31 x B 446-8	12	0	2	0	3	0 7
B 2850-1	" x B 607-72	6	0	0	0	0	2 4
B 2855-1	B 721-29 x B 355-44	5	4	0	0	0	1 0
B 2856-1	B 724-7 x B 721-56	4	0	2	0	0	0 2
B 2857-1	B 1153-10 x B 721-30	7	0	1	1	2	1 2
B 2861-1	B 381-2 x B 445-41	10	1	0	1	1	3 4
B 2885-1	(X528-170) x B 76645	3	0	0	0	0	2 1
B 2894-1	Kennebec x Teton	38	3	8	5	5	3 12
B 2895-1	" x B 355-44	67	4	1	6	8	7 41
B 2896-1	" x B 445-41	38	0	1	1	3	7 26
B 2900	Ontario x B 355-44	62	5	8	2	10	9 28
B 2906	B 355-24 x B 446-58	21	2	1	3	2	2 11
B 2909	B 402-1 x B 607-72	18	7	7	1	1	0 2
B 2911	B 446-54 x Teton	49	16	6	11	3	4 9
B 2912	B 446-58 x B 607-72	10	0	0	2	2	3 3
B 2918	B 607-37 x B 607-56	43	5	12	6	4	4 12
B 2919	B 607-56 x B 355-24	9	2	4	0	1	0 2
B 2920	" x B 402-1	25	3	7	0	7	4 4
B 2921	" x (X528-170)	15	1	1	0	0	2 11
B 2922	B 607-72 x B 598-29	39	7	7	0	5	1 19
B 2923	B 608-56 x B 580-20	5	0	1	0	1	0 3
B 2924	" x B 594-46	10	1	0	0	0	3 6
B 2978	B 673-76 x B 721-29	4	0	0	1	0	0 3
B 2984	B 572-92 x B 446-8	4	1	1	0	0	1 1
B 2990	B 578-39 x "	3	0	0	0	0	0 3
B 3010	B 607-72 x "	13	7	3	0	0	0 3
B 3012	B 779-1 x "	17	1	6	1	2	3 4
B 3020	B 721-29 x B 724-1	13	3	1	3	2	2 2
B 3021	B 721-30 x "	41	4	10	6	8	3 10
B 1308	B 607-56 selfed	3	1	1	0	0	0 1

1/ Five seed pieces of each seedling in the progeny inoculated by dipping in heavy suspension of ring-rot bacteria.

2/ 0 = no infection
1 = 1 out of 5
2 = 2 " " "

3 = 3 out of 5
4 = 4 " " "
5 = all is infected

Bonde et al. table 3. Reaction to ring-rot of miscellaneous selected seedlings used in breeding programs - 1951.

Pedigree or variety	Parentage	No. plants infected <u>1/</u>				
		1	2	3	4	5
B 35-16	Hindenburg x Earlane				x	
B 41-4	Arnica x Earlane		x			
B 44-14	627-216 x "				x	
B 56-1	Ostragis x "					x
B 56-9	" x "					x
B 56-11	" x "					x
B 69-28	Katahdin x 96-56				x	
B 67-1	(X627-11) x 96-56					x
B 71-4	47562 x 96-56				x	
B 83-9	96-140 x (X926-36)				x	
B 287-2	Katahdin x 96-56					x
B 294-22	Houma x "					x
B 294-38	" x "					x
B 313-16	Sequoia x "					x
B 355-24	96-5a x Saranac	x				
B 381-24	B 106-a x (X599-a)					x
B 395-5	(X245-39) x (528-170)	x				
B 400-1	(X499-a) x B 56-11		x			
B 401-1	(X499-a) x (X245-25)					x
B 401-3	" x "					x
B 402-1	(X499-a) x (X528-349)				x	
F 431	Ca. Sdlg.					x
B 446-58	(X96-44) x Saranac					x
B 461-32	Hindenburg x Katahdin					x
B 478-1	Sequoia x (X96-56)		x			
B 505-44	Chippewa x Teton			x		
B 524-53	(X1241-62) x (X792-76)					x
B 529-88	Teton x (X96-56)					x
B 538-18	B 44-14 x B 1034-4					x
B 572-92	Katahdin x (X247-36)			x		
B 579-3	B 24-58 x Katahdin					x
B 579-11	" "					x
B 594-15	(X627-126) x B 61-3				x	
B 595-76	41956 x B 61-3				x	
B 595-135	" x "					x
B 595-175	" x "				x	
B 595-183	" x "			x		
B 595-187	" x "	x				
B 597-2	Pungo x Cherokee			x		
B 598-29	Ir. Cobbler x (X627-126)				x	
B 606-3	41956 x (X96-56)					x
B 606-37						x
B 606-67				x		
B 616-58	Mohawk x 46952					x
B 721-1	Earlane x Teton	x				
B 721-35	" x "	x				
B 728-8	(X792-133) x Katahdin					x
B 738-16	Katahdin x Cherokee			x		

Bonde et al. table 3 continued

Pedigree or variety	Parentage	No. plants infected 1/				
		1	2	3	4	5
B 738-17	Katahdin x Cherokee					x
X 750-10	Imperia x Katahdin				x	
B 762-81	(X96-44) x Teton			x		
B 773-8	(X499-8) x Cherokee					x
B 778-43	(X792-88) x "					x
B 779-1	" x (X96-56)					x
B 779-16	" x "					x
B 874-2	(X247-44) x Cherokee					x
B 874-15	" x "					x
B 874-35	" x "				x	
B 874-56	" x "		x			
B 874-108	" x "					x
B 881-12	Mohawk x (X157-9)	x				
B 884-19	(X792-88) x (X157-9)				x	
B 899-3	B 461-32 x "					x
B 899-25	" x "					x
B 899-38	" x "					x
B 899-42	" x "					x
B 899-48	" x "			x		
B 904-6	B 81-40 x (X927-3)		x			
B 915-2	B 231-3 x B 355-24	x				
B 919-21	B 355-24 x (X792-94)			x		
B 920-5	B 401-3 x B 355-24		x			
B 922-6	TI5 x "					x
B 922-10	" x "			x		
B 922-12	" x "		x			
B 922-18	" x "					x
B 922-21	" x "	x				
B 926-9	B 661 x (X792-94)					x
B 926-9	" x "			x		
X 927-3	AAP-9 x Katahdin				x	
B 929-6	(X792-88) x B 81-40					x
B 929-32	" x "					x
B 935-3	(X96-56) x B 794-38					x
B 935-6	" x "				x	
B 935-9	" x "				x	
B 936-12	(X792-94) x B 294-38		x			
B 939-10	41956 x "					x
B 939-16	" x "					x
B 982-8	Chippewa x (X792-94)	x				
B 982-11	" x "					x
B 982-16	" x "					x
B 982-21	" x "				x	
B 982-23	" x "				x	
B 2160-15	B 381-2 x (X157-9)					x
B 2161-3	" x B 401-3				x	
B 2162-11	" x (X528-170)				x	
B 2162-18	" x "					x
B 1086-3	X528-170 Selfed					x

Bonde et al. table 3 concluded.

Pedigree or variety	Parentage	No. plants infected 1/				
		1	2	3	4	5
B 1104-29	X 96-56 Selfed				x	
B 1113-254	Triumf Selfed					x
B 1113-367	" "					x
B 1113-393	" "					x
B 1113-398	" "					x
B 1172-34	Chippewa Selfed					x
B 81-40	(X245-52) x (X96-140)					x
B 81-46	" x "					x
B 738-8	Katahdin x Cherokee	x				
B 2387-2	Friso x Flava					x
B 2387-3	" x "					x
B 2387-20	" x "					x
B 2387-39	" x "					
B 2387-41	" x "				x	
B 2441-17	Ackersegen x Flava	x				
B 2441-22	" x "	x				
B 2442-5	Calrose x "					
B 2442-8	" x "		x			x
B 2442-22	" x "	x				
B 2442-30	" x "		x			
B 2442-37	" x "	x				
B 2444-16	Earlaine x "					x
B 2444-31	" x "					x
B 2444-66	" x "	x				
B 2447-2	Parnassia x "			x		
B 2447-17	" x "				x	
B 1214-10	Flava Selfed					x
B 1214-13	" "	x				
B 1214-14	" "					x
B 1218-5	Starkeragis Selfed				x	
Katahdin	40568 x 24642				x	
Chippewa	" x "				x	
X792-94	41956 x Earlaine					x
X96-44	3895-13 x "					x
X96-44	" x "					x
B 66-1	(X528-170) x (X96-56)					x
B 605-10	Pungo x (X96-56)				x	
B 778-43	(X792-88) x Cherokee		x			
B 926-6	B 66-1 x (X792-94)				x	
B 962-32	B 81-40 x (X245-186)				x	
B 1153-10	B 81-40 Selfed					x
Cherokee	(X96-56) x (X528-170)					x
Kennebec	B 127 x (X96-56)				x	
Pungo	(X96-44) x (X528-170)					x
B 355-44	(X96-56) x Saranac				x	

1/ Five freshly cut seed pieces of each selection inoculated by being dipped into a heavy water suspension of the ring-rot bacteria.

Comparison of Yields and Tuber Type for 16 Ring-rot-Resistant
Seedlings and Varieties, Presque Isle, Maine, 1951
Reiner Bonde and Donald Merriam

During 1951, 14 unnamed seedlings and 2 named varieties, all resistant to ring rot, were compared in a replicated field test with 6 named varieties regarding their ability to produce good yields of marketable potatoes.

The plots were thoroughly sprayed throughout the season. Late blight was absent from the field. All of the yields were taken from rows that were not injured by the sprayer equipment wheels. The elimination of these two factors helps to make these yield data more reliable.

Bonde and Merriam table 1 gives the total yield and the yield of U.S. No. 1 potatoes for the seedlings and varieties included in the experiment.

The Green Mountain variety produced the highest total yield and also the largest crop of marketable tubers. Although this variety produced the highest yield rate, the tubers were less attractive than those of most of the other varieties and seedlings tested.

Kennebec continued to produce high yields and ranked second in yield ability. Teton, B 911-2, Erie, and Sebago produced larger total yields and more marketable potatoes than did the most commonly grown variety, Katahdin.

Seedlings B 911-31, B 909-1, and B 355-44 produced somewhat smaller yields than Katahdin but produced more marketable potatoes.

Seedling B 911-2 produced a good crop of attractive tubers and merits further testing. That this seedling is not resistant to late blight makes it unfavorable for consideration as a possible variety for Maine.

The data show that 10 unnamed seedling varieties produced somewhat smaller yields than the control variety Katahdin. Although these seedlings appear to lack the ability to produce large yields, they all have attractive tubers and possess fair to good tuber type.

It is important that a number of the ring-rot-resistant varieties included in the experiment are highly resistant to late-blight infection. The data demonstrate that desirable commercial potato varieties can be developed that are highly resistant to both ring rot and late blight.

Bonde and Merriam table 1. Comparison of yields for 16 ring-rot-resistant seedlings and varieties. Green Mountain, Katahdin, Kennebec, and Sebago are included for comparison. Plots sprayed 1951.

Variety or seedling	Parentage	Yield per acre ^{1/}				Appearance and tuber type
		Total crop		U.S. No. 1 ^{2/}		
		Bbl.	Bu.	Bbl.	Bu.	
Gr. Mountain	Dunmore x Excelsior	259	712	249	686	Poor to fair
Kennebec	X96-56 x B 127	222	611	210	577	Good
Teton	45146 x Earlane	222	610	206	567	"
B 911-2	055 x Teton	219	601	200	551	"
Erie	45146 x Earlane	212	582	199	547	Fair
Sebago	Chippewa x Katahdin	208	573	183	504	"
Katahdin	40568 x 24642	199	547	178	489	Good
B 911-31	055 x Teton	199	546	180	496	Fair
B 911-21	" x "	198	545	137	378	"
B 909-1	" x B 30-143	194	534	182	500	Poor
B 355-44	X96-56 x Saranac	193	530	189	519	Rough
B 721-C	Earlane x Teton	192	528	168	462	Fair
B 2117-2	Sebago x B 355-44	190	521	162	445	"
B 919-28	B 355-24 x (X792-94)	178	491	162	447	"
B 721-1	Earlane x Teton	172	472	154	423	Good
B 721-A	" x "	152	418	130	356	Fair
B 724-7	Sequoia x "	149	410	137	377	Good
B 2116-4	Sebago x B 355-44	145	400	135	371	"
B 721-B	Earlane x Teton	142	390	112	307	Fair
B 930-26	Teton x (X792-94)	141	388	130	358	"

L.S.D. at 5% level 29.8 barrels or 82.1 bushels

L.S.D. at 1% level 39.7 barrels or 109.3 bushels.

1/ Average of four replicated plots each 25 feet in length.

2/ Graded for size 2 1/4 inches or more in diameter. Not graded for cut or bruised tubers.

Combining Ring Rot and Late Blight Resistance
Reiner Bonde, Donald Merriam, and Robert Akeley

The Maine Agricultural Experiment Station and the United States Department of Agriculture are cooperating in an attempt to produce potato varieties that have good marketing qualities and resistance to both late blight and ring rot.

As a part of the National Potato-Breeding Program ring-rot and late-blight-resistant seedlings or varieties were crossed to combine resistance of both diseases in the same variety.

During 1951, freshly dug tubers of 72 selected ring-rot-resistant seedlings were inoculated in damp chambers to determine their resistance to late blight.

Bonde et al. table 1 summarizes the results of this experiment. The data show that the tubers of 33 ring-rot-resistant seedlings were free of late-blight infection and apparently are resistant to both diseases. Also, 15 other ring-rot-resistant seedling varieties became infected with late blight chiefly through skin wounds, and probably also are highly resistant.

It is significant that all of the seedlings included in this experiment produced attractive tubers and good yields. These data indicate that it should not be difficult to produce by breeding methods good commercial varieties that are highly resistant to or immune from both ring rot and late blight.

Bonde et al. table 1. Reaction of different ring-rot-resistant seedlings to late blight tuber rot. 1/2/

Pedigree	Parentage	Tubers inoculated	Rotted tubers		Reaction to tuber infection
		No.	No.	Pct.	
B 355-24	X96-56 x Saranac	7	0	0	Resistant
B 607-72	B 83-9 x Teton	5	2	40	Susceptible
B 721-38	Earlaine x Teton	6	6	100	"
B 271-35	" x "	6	5	83	"
B 721-48	" x "	5	5	100	"
B 721-29	" x "	4	4	100	"
B 721-2	" x "	5	5	100	"
B 721-29	" x "	8	5	63	"
B 721-35	" x "	7	6	86	"
B 723-20	Sebago x Teton	5	5	100 ³ / ₄	Possibly res.
B 723-35	" x "	8	6	75 ³ / ₄	" "
B 723-33	" x "	6	4	67	Susceptible
B 724-7	Sequoia x Teton	5	5	100	"
B 724-7	" x "	5	5	100	"
B 725-61	B 336-184 x Teton	5	5	100	"
B 725-50	" x "	5	5	100 ³ / ₄	Possibly res.
B 725-41	" x "	5	4	80 ³ / ₄	"
B 725-37	" x "	5	5	100	Susceptible
B 725-25	" x "	5	4	80 ³ / ₄	Possibly res.
B 725-27	" x "	5	5	100	Susceptible
B 725-1	" x "	7	5	71	"
B 725-8	" x "	7	7	100	"
B 725-25	" x "	6	5	83	"
B 725-32	" x "	5	2	40 ³ / ₄	Possibly res.
B 725-37	" x "	6	6	100	Susceptible
B 762-50	B 96-44 x Teton	5	2	40 ³ / ₄	Possibly res.
B 766-?	B 157-9 x "	5	0	0	Resistant
B 766-1	" x "	5	5	100	Susceptible
B 873-12	(X247-44) x Teton	8	4 ² / ₄	50	"
B 907-22	B 30-143 x B 81-40	7	6	86	"

Bonde et al. table 1 continued

Pedigree	Parentage	Tubers inocu- lated	Rotted tubers		Reaction to tuber infection
		No.	No.	Pct.	
B 909-1	055 x B 30-143	5	5	100	Susceptible
B 909-2	" x "	9	9	100	"
B 911-39	055 x Teton	6	6	100	"
B 911-21	" x "	6	6	100	"
B 911-11	" x "	6	6 ² / ₇	100	Possibly res.
B 913-13	055 x B 355-24	6	0	0	Resistant
B 918-6	B 237-3 x 355-24	4	0	0	"
B 919-28	B 355-24 x (X792-94)	6	0	0	"
B 919-27	" x "	5	0	0	"
B 919-25	" x "	4	0	0	"
B 919-22	" x "	7	7	100	Susceptible
B 921-6	B 66-1 x B 355-24	6	0	0	Resistant
B 924-19	46952 x B 355-24	5	5	100	Susceptible
B 930-19	Teton x (X792-94)	5	5	100	"
B 931-19	B 355-24 x "	5	0	0	Resistant
B 1161-1	Teton selfed	5	5	100	Susceptible
B 1161-11	" "	6	6	100	"
B 1235-3	B 607-56 selfed	5	0	0	Resistant
B 2098-41	Mohawk x B 355-24	8	0	0	"
B 2105-4	Ostebote x Teton	7	3 ³ / ₇	43	Possibly res.
B 2105-21	" x "	8	8	100	Susceptible
B 2108-20	" x B 355-44	8	0	0	Resistant
B 2116-2	Sebago x B 355-44	5	0	0	"
B 2117-8	" x "	8	0	0	"
B 2182-1	(X792-94) x B 355-44	8	5 ³ / ₈	63	Possibly res.
B 2335-2	B 76-23 x B 445-41	7	0	0	Resistant
B 2390-6	B 606-37 x B 607-56	5	2 ³ / ₅	40	Possibly res.
B 2390-19	" x "	5	0	0	Resistant
B 2391-1	B 607-56 x B 355-44	5	0	0	"
B 2391-14	" x "	5	3	60	Susceptible
B 2395-30	B 607-72 x B 606-3	5	4	80	"
B 2395-7	" x "	5	0	0	Resistant
B 2396-1	" x B 607-56	6	1 ³ / ₆	17	Possibly res.
B 2396-3	" x "	4	0	0	Resistant
B 2396-7	" x "	6	2 ³ / ₆	33	Possibly res.
B 2396-12	" x "	6	2 ³ / ₆	33	" "
B 2396-20	" x "	6	6	100	Susceptible

Bonde et al. table 1 continued

Pedigree	Parentage	Tubers inocu- lated	Rotted tubers		Reaction to tuber infection
		No.	No.	Pct.	
B 2425-20	B 478-1 x B 607-56	4	0	0	Resistant
B 2431-38	Chippewa x B 445-41	5	0	0	"
B 2431-41	" x "	5	0	0	"
B 2431-56	" x "	5	5	100	Susceptible
B 2431-79	" x "	6	5	83	"
B 2431-48	" x "	7	4 ³ / ₅	57	Possibly res.
B 2431-28	" x "	5	3	60	Susceptible
B 2434-3	B 607-72 x B 778-14	6	2 ³ / ₅	33	Possibly res.
B 2434-16	" x "	5	0	0	Resistant
B 2437-9	B 778-14 x B 607-56	6	0	0	"
B 2437-1	" x "	4	1	25	"
B 2437-8	" x "	6	0	0	"
B 2574-6	B 446-54 x B 76-23	2	0	0	"
B 2574-10	" x B 76-41	3	0	0	"
B 2583-9	B 580-20 x B 445-41	4	0	0	"
B 2587-1	B 607-55 x B 61-3	5	0	0	"
Not known definitely but probably as follows:					
B 721-	Earlaine x Teton	5	5	100	Susceptible
B 721	" x "	6	6	100	"
B 721	" x "	5	5	100	"
B 721	" x "	6	6	100	"
B 725	Mohawk x B 355-24	8	0	0	Resistant
	" x "	7	3	43	"
	" x "	6	0	0	"
	" x "	5	0	0	"
	" x "	5	0	0	"
Control					
Erie	45146 x Earlaine	7	4	57	Susceptible
Gr. Mt.	Dunmore x Excelsior	20	19	95	"
Katahdin		6	5	83	"
Kennebec	X96-45 x B 127	16	3 ³ / ₅	19	Resistant

- 1/ Tubers harvested by hand and inoculated by spraying with heavy suspension of late-blight conidia washed from potato foliage.
- 2/ The seedlings included in this experiment have remained free from ring-rot infection following severe inoculation for 3 or more years.
- 3/ Infection occurred through stolen wounds or skin abrasions. Unbruised tubers may be resistant.

Comparison of Yields and Defoliation by Phytophthora infestans
of Different Ring-rot and Late-Blight-Resistant Seedlings

Reiner Bonde

As a result of the National Potato-Breeding Program a number of seedling varieties that are highly resistant to both ring rot and late blight infection, have been developed. Although these seedlings have been tested for disease resistance, they have not been grown extensively to test their ability to yield and resist late blight and ring rot infection under field conditions.

Fourteen selected seedlings that are resistant to both ring rot and late blight were compared with Green Mountain, Katahdin, and Kennebec varieties in a replicated field experiment.

No fungicide or insecticide spray applications were made during the season and the late-blight disease was permitted to develop.

Prevalence of Late Blight

Resistance in Foliage. The late-blight disease was very destructive during the 1951 season. Bonde table 1, column 3, compares the percentage of defoliation of the different varieties on August 30.

Green Mountain and Katahdin were 52 and 56 percent defoliated. Sebago possessed a considerable degree of resistance in the tests and was only 3 percent defoliated. Ring-rot-resistant seedlings B 721-29 and B 924-19 had 2.5 percent and 3.5 percent defoliation, respectively, and were in the same class as Sebago regarding resistance to late blight.

The 12 other ring-rot-resistant seedlings and Kennebec were free from late blight infection on the foliage and are highly resistant to the disease. It is known, however, that Kennebec may develop virulent strains of the fungus some years and become susceptible to the disease as the season advances.

Experiments should be conducted to determine whether the late-blight-resistant seedlings included in this experiment are resistant only to the "common Potato Strain" of Phytophthora infestans.^{1/}

Resistance in Tubers. About 3 percent of the Green Mountain and Katahdin tubers had late blight decay at the time of harvest. All of the other varieties had no tuber rot when the crop was dug and appear to be resistant under normal field conditions.

^{1/} The results of one experiment conducted in 1951 indicate that B 355-44 may be more resistant than Kennebec.

Bonde table 1. Yields and defoliation by Phytophthora infestans for different ring-rot and late blight-resistant seedlings.

Not sprayed 1951

Variety or pedigree	Parents	Defolia- tion late blight <u>1/</u>	Total yield per acre <u>2/</u>		Tuber type
		Pct.	Bbl.	Bu.	
Kennebec	X 95-56 x B 127	0	283	779	Rough
B 446-8	(X96-44) x (X336-144)	0	253	697	Good, slight- ly rough
B 907-18	B 30-143 x B 81-40	0	248	682	Rough
B 355-24	(X96-56) x (X336-144)	0	228	628	"
Gr. Mt.	Dunmore x Excelsior	52.0	223	612	"
B 921-6	B 66-1 x B 355-24	0	209	574	Good
B 355-44	(X96-56) x (X336-144)	0	199	546	"
B 447-98	96-345 x 336-184	0	199	546	Poor
B 721-29	Earlaine x Teton	2.5	183	502	Rough, small
Sebago	Chippewa x Katahdin	3.0	183	502	Good
B 2117-8	Sebago x B 355-44	0	172	474	Good, small
B 924-19	46952 x B 355-24	3.5	171	472	"
B 931-3	B 355-24 x (X792-94)	0	168	461	Good, small
B 725 (?)	B 336-184 x Teton	0	168	461	Rough
Katahdin	40568 x 24642	56.0	167	459	Good
B 725(?)	B 336-184 x Teton	0	164	451	V. good, small
B 2142-15	76-43(Pungo) x B 445-41	0	161	443	Small
B 725 (?)	B 336-184 x Teton	0	158	436	Good, small

L.S.D. at 5% level 3.50 barrels or 9.63 bushels.

L.S.D. at 1% level 4.65 barrels or 12.80 bushels.

1/ Observations August 30.

2/ Average of six replicated one-row plots, each 20 feet long.
Arranged in descending order of yield.

Comparison of Yields

Columns 4 and 5 of Bonde table 1 give the yields for the different varieties arranged in descending order. The Kennebec variety yielded significantly more than the other varieties included in the experiment.

It is significant that three unnamed seedlings yielded more than Green Mountain and 12 more than the most commonly grown variety Katahdin. All of the seedlings can be classed as possessing good yielding ability.

Tuber Appearance and Quality

The different varieties were not graded for size. It was observed, however, that all of the varieties with the exception of B 447-98 and B 721-29 had as good or better appearing tubers than Green Mountain and Kennebec.

B 4446-8 produced good yield and had good appearance but was slightly rough in comparison with some of the newer seedling selections made for desirable tuber type. B 907-18 and B 355-24 also produced good yield rates, but the tubers were classified as rough. The latter varieties, however, were not less desirable than Green Mountain and Kennebec in this respect.

A number of the seedling selections possessed good tuber appearance but were rather small. This smaller size, however, may not be undesirable from the standpoint of marketing the crop.

The results of this experiment show that high-yielding potato varieties of good quality and resistance to late blight and ring rot can be produced.

By Donald Folsom

Leaf Roll: In 1952, 12 resistant seedlings having possible commercial merit were grown at Highmoor Farm in southwestern Maine. These and 10 others from the Aroostook Farm aphid-transmission tests were subjected to a yield test on Aroostook Farm. The value of this yield test was reduced by excessiveness of soil moisture early in the season, late planting, midsummer drought, and an early killing frost. However, enough data on yield rate and tuber characteristics were secured to make desirable the discarding of all but 4 of these 22 seedlings. The 4 are as follows:

<u>Seedling</u>	<u>Cross</u>	<u>Introduced to resistance test</u>
B 751-119	B 24-58 x Teton	1946 at Highmoor Farm
B 859-10	X 1276-185 x Teton	1947 " " "
B 2187-25	" x B 522-33	1948 " " "
B 2359-84	B 1122-25 x B 24-78	1949 " Aroostook Farm

B 24-58 is practically field-immune to leaf roll; B 24-78 is highly resistant; B 522-33 is resistant to aphid transmission; and X1276-185 is quite field-resistant and is being grown commercially to some extent in Maine. The seedlings introduced to the Highmoor Farm test is 1946, 1947, and 1948 totaled 3,335. None have been introduced there since 1948 except a few in 1949 and 1950 from the Aroostook Farm aphid-transmission test. These few have all been discarded.

MAINE

Kenneth F. Nielsen,^{1/} Robert V. Akeley,^{2/} and Paul N. Carpenter^{1/}

Potato Variety Trial

Potato variety testing is an integral part of a process of producing new and better potatoes. Before varieties are released for commercial production, they must meet high standards of disease resistance, be of good eating quality, and have high yield. New varieties observed in these trials have been in a series of tests conducted cooperatively by the Maine Agricultural Experiment Station and the U.S. Department of Agriculture, and represent only a small percentage of these tested.

Varieties possessing the desired qualities are increased at the farm of the Maine State Seedboard from where they are released to foundation and certified seed growers who grow them for general farm distribution.

The whole process of variety testing is one of careful observation, careful selection, and extensive testing under controlled conditions so that most of the varieties released will measure up to what is expected of them.

1952 Variety Trials

The 1952 variety trials were conducted at Pittsfield, Exeter, Sherman, Presque Isle, and on Aroostook Farm, Maine. These locations were used since they represent different environmental conditions of potato-growing areas of the State.

Amounts of fertilizers used at each farm varied because the fertility levels of the plots differed. The farmers and county agents recommended the amounts to be applied on the basis of past experience.

Seed pieces were planted at two different spacings within the rows, 6 inches and 9 inches. The rows were 34 inches apart and 36 feet long with 4-foot alleys between replicates. The varieties were arranged at random in blocks with four replications at each farm.

Eight named and six unnamed varieties were included in the trials in 1952. Of the unnamed group, four were included for the first time this year. Varieties such as Katahdin, Irish Cobbler, and Green Mountain were included

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as standards because of their long acceptance as commercial varieties.

Unfortunate climatic conditions prevailed in 1952, which reduced the value of the results obtained. In early spring, excessive moisture caused rotting of seed at some locations and washouts at others. Later, a dry spell developed. When it persisted, supplementary water was added at two locations. Since sprinkler operation was new to the farmers, at one farm water was not added uniformly to the plots.

Total Yield

Total yields of tubers for each variety at each farm are given in Nielsen table 1.

Nielsen table 1. Total yields in bushels per acre at each location.

Variety	Location and yield per acre				
	Pittsfield	Exeter	Sherman	Presque Isle	Averages
	Bu.	Bu.	Bu.	Bu.	Bu.
Cherokee	205	490	288	408	347
Irish Cobbler	268	462	304	346	345
Katahdin	206	530	277	391	351
Triumph	190	409	241	360	300
B 515-2	186	416	255	322	295
Gr. Mountain	316	605	414	460	449
Kennebec	258	546	392	404	400
Ontario	248	615	403	427	423
Pungo	273	449	372	392	372
B 355-35	226	461	351	386	357
B 606-67	342	505	331	466	411
46125	246	533	272	360	353
B 583-67	266	431	304	374	344
B 859-10	246	479	242	322	321
Ave.	248	494	318	387	

Rainfall during the growing season was inadequate at all locations. Supplementary water was added by sprinkler irrigation at Pittsfield and Exeter. At Pittsfield, the water was added too late in the season to obtain much response. The beneficial effects of supplementary water applied at the right time can be seen in the results obtained at Exeter.

At harvest, tubers from the Pittsfield and Exeter plots were examined for disease. Verticillium wilt infection was found in both. Of the 10 varieties that had the highest average yield for the ⁴/₄ farms, 5 were resistant to late blight.

Spacing and Yields

Total yields from the 6- and 9-inch spacings within rows are given in Nielsen table 2. Although in most instances the difference was not great, a slightly higher average was obtained from the 6-inch spacing. The only location where the 6-inch spacing consistently outyielded the 9-inch was at Exeter where there was sufficient moisture.

Nielsen table 2. Total yields in bushels per acre from 6- and 9-inch spacing within rows.

Variety	Location and yield per acre									
	Pittsfield		Exeter		Sherman		Presque Isle		Averages	
	6"	9"	6"	9"	6"	9"	6"	9"	6"	9"
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
Cherokee	188	222	557	412	274	318	410	405	357	339
I. Cobbler	230	305	488	436	273	392	319	374	327	377
Katahdin	196	216	546	512	305	220	377	404	356	338
Triumph	158	221	423	394	233	254	357	364	293	308
B 515-2	157	214	428	403	255	254	316	328	289	300
Gr. Mt.	339	293	685	524	414	413	472	448	478	420
Kennebec	232	283	559	532	398	380	402	406	398	400
Ontario	277	219	629	605	413	382	459	396	445	400
Pungo	266	280	505	394	410	296	417	367	400	334
B 355-35	210	242	484	438	359	337	385	387	359	351
B 606-67	387	300	523	488	361	273	478	453	437	378
46125	266	227	578	466	271	277	366	354	370	331
B 583-67	268	264	511	351	323	258	406	342	377	304
B 859-10	307	186	548	401	241	244	369	274	366	276
Ave.	249	248	533	454	324	307	395	379	375	347

The yields of tubers, 2 inches and more in diameter are shown in Nielsen table 3. Here again there was little consistency in yield with seed spacing for the varieties considering all locations. However, at Exeter, where moisture was abundant, and to some extent at Presque Isle, where the drought was not as serious as elsewhere, there were better yields of tubers 2 inches and more in diameter from the 6-inch spacing.

Although more tubers were produced from the 6-inch than from the 9-inch spacing in all instances only where available moisture exceeded a critical limit was the yield greatly improved as a result.

Nielsen table 3. Yields in bushels per acre from 6- and 9-inch spacings within rows of size greater than 2-inch diameter 1/

Variety	Location and yield per acre									
	Pittsfield		Exeter		Sherman		Presque Isle		Averages	
	6" 9"	6" 9"	6" 9"	6" 9"	6" 9"	6" 9"	6" 9"	6" 9"	6" 9"	6" 9"
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
Cherokee	122	198	469	382	200	270	367	378	289	307
I. Cobbler	186	290	455	411	196	357	262	354	275	353
Katahdin	168	200	549	501	266	194	356	392	335	322
Triumph	109	206	393	379	175	214	318	339	249	284
B 515-2	124	194	416	389	218	233	281	309	260	281
Gr. Mt.	317	246	664	505	358	388	422	401	440	385
Kennebec	197	262	515	500	369	347	381	378	365	372
Ontario	217	163	549	549	357	329	374	326	374	342
Pungo	238	263	489	380	376	276	391	349	373	317
B 355-35	157	209	434	392	278	285	326	349	299	309
B 606-67	344	286	495	471	284	221	433	412	389	348
46125	224	193	543	429	221	239	321	313	327	293
B 583-67	177	199	429	290	183	162	283	255	268	226
B 859-10	270	161	518	384	164	201	312	233	316	245
Ave.	204	220	494	426	260	265	345	342	326	313

1/ Of this yield, approximately 2 percent on the 6-inch spacing and 5 percent on the 9-inch spacing are considered too large for desirable table stock.

Specific Gravity

An increase in specific gravity of potatoes is generally related to an increase in starch content. For each increase in specific gravity of 0.005, the starch increases by approximately 1 percent. It has been found that the potato mealiness increases with an increase in starch and dry matter. Therefore, specific gravity affords a convenient general estimate of eating quality. In these trials the specific gravity was determined for 20 uniform-sized tubers 2 to 2 1/2 inches in diameter. The information is shown in table 4.

The specific gravities were obtained as soon after harvest as possible to reduce variation from desiccation. At all locations except Presque Isle, the values were quite low compared with the values shown in table 3 of the Maine Agricultural Experiment Station Mimeographed Report No. 26 (January 1952).

There was a differential in planting dates, early at Presque Isle and somewhat later at the other locations, which undoubtedly influenced specific gravity values. Earlier May plantings resulted in potatoes with higher specific gravities than plantings later in the month.

Nielsen table 4. Specific gravity of tubers in 1952 trials.

Variety	Pitts- field	Exeter	Sherman	Presque Isle	Average	Average dry matter	^{1/} Eating quality
Cherokee	1.061	1.071	1.079	1.090	1.075	18.6	M
I. Cobbler	1.064	1.071	1.078	1.091	1.076	18.9	M
Katahdin	1.055	1.066	1.071	1.080	1.068	17.1	M
Triumph	1.054	1.065	1.064	1.083	1.066	16.7	M
B 515-2	1.057	1.065	1.067	1.080	1.067	16.9	M
Gr. Mt.	1.061	1.070	1.080	1.090	1.075	18.6	VH
Kennebec	1.056	1.061	1.073	1.081	1.068	17.1	H
Ontario	1.049	1.058	1.066	1.073	1.062	15.8	L
Pungo	1.063	1.066	1.080	1.086	1.074	18.4	H
B 355-35	1.055	1.061	1.073	1.083	1.068	17.2	M
B 606-67	1.068	1.069	1.082	1.090	1.077	19.0	H
46125	1.058	1.068	1.079	1.083	1.072	18.0	M
B 583-67	1.067	1.078	1.081	1.092	1.080	20.0	VH
B 859-10	1.064	1.069	1.073	1.088	1.074	18.4	H
Ave.	1.059	1.067	1.075	1.085			

^{1/} VH = Very high
H = High
M = Medium
L = Low

Date of planting	5/26	5/27	5/28	5/6
Date of harvest	9/25	9/26	9/29	9/20
Date of sp. gr. measurements	9/25	9/26	9/29	10/1

MAINE

G. W. Simpson and Reiner Bonde

Leaf Roll Resistant Seedlings

Testing for leaf roll resistance, using viruliferous green peach aphids, was continued at Presque Isle. Seedlings received from the breeding work in Beltsville numbered 5,494, representing 16 crosses. All of these had at least one resistant parent. In addition 294 selected seedlings from the Chapman farm were represented by 5 hills. Of these only 10 failed to show current-season symptoms of leaf roll.

The results in 1952, based on current-season symptoms of leaf roll, were much better than in 1951. In that year 207 or 2.9 percent of the new introductions were saved for retesting. In 1952 the figures were 583 and 10.6 percent.

Of the seedlings indicated as saved in Simpson and Bonde table 1 of the 1951 report, only one, B 876-9, was judged satisfactory for further tests. The others were eliminated in 1952 because of low yield or poor type.

One seedling, B 2834-3, showed some russetting and was free from scab in a field where scab was abundant. It is considered at this time to be the most promising seedling observed so far in these tests. It is being increased for further testing.

Simpson and Bonde tables 1 to 4, inclusive, give the results of these tests from 1949 through the 1952 season.

Simpson and Bonde table 1. Reaction of progenies of different crosses and a selfed line to leaf roll infection resulting from artificial inoculations with viruliferous green peach aphids in each of four successive seasons--1949 - 1952

Pedigree	Parentage	Seedlings planted 1949 ^{1/}	Replanted			Saved for retesting in 1953
			1952	1951	1950	
		No.	No.	No.	No.	No.
B 1221	B 24-78 selfed	150	14	24	35	8
B 2353	WSC17 x B 1122-25	105	5	18	26	4
B 2354	B 24-78 x B 582-33	80	5	8	17	5
B 2357	B 582-66 x B 584-11	156	10	23	68	9
B 2359	B 1122-25 x B 24-78	331	33	64	101	25
B 2360	B 1122-25 x B 584-11	168	4	11	29	3
B 2362	B 1122-25 x X 1276-185	48	1	6	10	1
B 2378	B 583-66 x B 582-33	144	9	23	31	5
B 2382	B 673-76 x X1276-185	155	1	9	24	1
B 2449	Houma x Netted Gem Mutant	381	2	11	100	2

^{1/} 36 crosses were included in the 1949 introductions.

Simpson and Bonde table 2. Reaction of progenies of different crosses to leaf roll infection resulting from artificial inoculations with viruliferous green peach aphids in each of three successive seasons -- 1950-52.

Pedigree	Parentage	Seedlings planted 1950 ^{1/} No.	Replanted		Saved for retesting in 1953 No.
			1952 No.	1951 No.	
B 2834	B 294-38 x X157-9	230	5	54	1
B 2925	X1276-185 x B 76-23	275	17	49	3
B 2926	X1276-185 x B 355-44	289	11	43	1
B 2931	Empire x B 872-70	107	11	20	5
B 2932	Kennebec x B 872-70	24	2	6	2
B 2937	Virgil x B 522-33	102	3	13	3
B 2939	B 583-66 x B 582-33	190	35	88	19
B 2940	B 584-11 x B 1122-25	44	3	15	3
B 2941	B 673-76 x B 1122-25	224	21	76	18
B 2943	Aquila x Triumph	28	1	2	1
B 2946	Houma x Triumph	71	6	13	2
B 2949	B 420-174 x Triumph	204	12	39	6
B 2953	B 514-14 x B 446-8	261	3	7	1
B 2954	B 514-14 x B 578-39	207	9	28	3
B 2956	B 572-92 x B 778-43	64	1	1	1
B 2958	B 583-66 x B 986-7	212	48	83	40
B 2959	B 583-67 x B 572-70	172	16	41	9
B 2964	B 876-63 x B 872-70	68	2	5	1
B 2965	B 876-63 x B 986-70	283	10	28	9
B 2967	B 927-3 x B 878-28	86	2	4	1
B 2971	B 574-14 x B 872-70	230	18	36	11
B 2976	B 583-66 x B 872-70	292	56	71	36
B 2977	B 583-67 x B 578-39	179	24	52	15
B 2983	B 864-17 x B 986-7	78	9	26	4
B 3024	B 724-20 x B 872-70	94	3	5	1

^{1/} 65 crosses were introduced in 1950.

Simpson and Bonde table 3. Reaction of progenies of different crosses and selfed lines to leaf roll infection resulting from artificial inoculation with viruliferous green peach aphids in each of two successive seasons -- 1951 -1952.

Pedigree	Parentage	Seedlings planted ^{1/} in 1951	Replanted 1952	Saved for retesting in 1953	Surviving two inoculations
		No.			Pct.
B 1339	B 514-14 selfed	63	17	6	1.0
B 1360	B 936-12 selfed	530	2	2	.4
B 3095	Houma x Triumph	713	46	25	3.5
B 3096	Houma x B 572-92	211	12	7	3.3
B 3115	B 514-14 x Triumph	595	35	12	2.0
B 3118	B 572-92 x B 446-8	378	8	2	.5
B 3119	B 583-66 x B 578-39	355	18	13	3.7
B 3120	B 583-66 x B 778-43	134	12	1	.8
B 3121	B 583-67 x B 721-29	370	6	1	.3
B 3146	B 724-15 x B 872-70	169	9	2	1.2
B 3155	B 876-63 x B 983-9	506	8	1	.2
B 3198	B 2091-35 x Menominee	184	4	1	.5
B 3206	X 927-3 x B 936-12	316	3	1	.3

²
1/ 20 crosses and/selfed lines introduced in 1951.

Simpson and Bonde table 4. Reaction of progenies of different crosses to leaf roll infection resulting from artificial inoculations with viruliferous green peach aphids in 1952.

Pedigree	Parentage	Seedlings planted 1952	Saved for retesting 1953	Surviving the first year's test
		No.	No.	Percent
B 3287	Katahdin x B 936-12	466	98	21.0
B 3288	B 505-44 x B 754-16	86	22	25.6
B 3289	B 505-44 x B 936-12	600	70	11.7
B 3290	B 572-92 x B 936-12	116	3	2.6
B 3291	B 579-11 x B 606-3	446	35	7.8
B 3292	B 579-11 x B 608-66	249	42	16.9
B 3293	B 579-11 x B 754-16	171	28	16.4
B 3294	B 579-11 x B 919-15	406	3	.7
B 3295	B 579-11 x B 936-12	550	37	6.7
B 3296	X 927-3 x B 936-12	77	17	22.1
B 3297	X 927-3 x Katahdin	213	3	1.4
B 3298	B 936-12 x B 2067-52	641	10	1.6
B 3299	B 936-12 x Katahdin	754	75	10.0
B 3300	B 2081-14 x B 864-2	224	9	4.0
B 3301	B 2113-9 x B 936-12	135	26	19.3
B 3302	B 2081-14 x B 936-12	360	105	29.2
		5,494	583	10.6

MARYLAND (Salisbury)

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Summary:

Tests for the adaptability of certain disease-resistant varieties of potatoes in early and late plots were made in a sandy soil at the Vegetable Research Farm, Salisbury, Md. The weather conditions during the season were generally unfavorable for best tuber growth. In the early plot, there was little incidence of disease; the varieties Pontiac, Cherokee, Kennebec, and Katahdin produced yields of #1's which were significantly better than that of Irish Cobbler. In the late plot, early blight was present and caused severe defoliation. Seedling B 355-44 and variety Sebago were not severely injured by early blight, but only B 355-44 and variety Kennebec produced yields of #1's which were significantly higher than that of Irish Cobbler. Kennebec, Canso, and Keswick had a low incidence of scab infection, but Keswick had the highest incidence of Rhizoctonia infection.

Procedure and Results:

The principal purpose of the work was to compare certain potato varieties and seedlings which possess resistance to certain common diseases with standard and established varieties as to their yield, and response to natural infection in the field.

Early and late plots were planted at the University of Maryland Vegetable Research Farm at Salisbury, Maryland. No fungicidal sprays were applied during the season. This was to permit observation of relative resistance of the potato varieties to foliage diseases that normally occur in that area. Insecticides were applied as required to control flea beetles, potato beetles, aphids, and leaf hoppers.

Certified seed of old and new varieties from various sources and seedlings from the United States Department of Agriculture were planted in these plots.

Early Planting: Twelve varieties and seedlings were planted on March 27, in 5 randomized replications, each containing 50-ft. rows. The cut, untreated seed pieces were planted with a mechanical planter in rows 36 inches apart with approximately 14 inches between seed pieces in the row. Fertilizer was applied at time of planting and during the growing season in accordance with best horticultural practice in the area.

Weather conditions were favorable for growth during the early part of the season. Abnormally hot, dry weather in June was not favorable for best growth of the tubers.

Foliage diseases were not severe. Some early blight appeared in the plots when the plants were almost mature but resulted in little damage.

The vines of variety Cobbler matured first, followed by seedling 1276-185, Pontiac, and seedling B 73-10; and the tops were dead when harvested on July 21. Tops of the other eight varieties were partially green when they were also harvested on July 21. Maryland table 1 shows the yields from the twelve varieties and seedlings. The varieties Pontiac, Cherokee, Kennebec, and Katahdin had yields of #1's which were significantly better than Irish Cobbler. Varieties Keswick and Kennebec gave the largest percentage of #1's and Kennebec also yielded the smallest percentage of #2's and culls.

Maryland table 1. Yield record of early potato plots at the University of Maryland Vegetable Research Farm Salisbury, Maryland.

Variety or seedling	Average yield per acre				US #1 to	US #2 to	Culls to
	US #1*	US #2*	Culls	Total	total	total	total
	Bu.	Bu.	Bu.	Bu.	Pct.	Pct.	Pct.
Pontiac	214	41	16	271	79	15	6
Cherokee	201	38	19	259	78	15	7
Kennebec	188	17	7	213	89	8	3
Katahdin	177	35	14	225	78	15	6
Sebago	142	33	14	189	75	18	8
Yampa	140	36	13	189	74	19	7
I. Cobbler	138	45	20	204	68	22	10
Marygold	138	25	14	177	78	14	8
Canso	136	29	10	176	77	17	6
B 73-10	132	35	12	179	74	19	7
1276-185	126	42	22	190	66	22	11
Keswick	122	16	10	149	82	11	7
L.S.D. 5%	36.2	11.0	2.9	30.9			
L.S.D. 1%	48.3	14.7	4.0	42.3			

* U.S. No. 1 and No. 2 equivalent, not officially graded.

Late Planting: Fourteen varieties and seedlings were planted on July 9, in 5 randomized replications, each containing 50 ft. rows. The cut, untreated seed pieces were planted with a mechanical planter in rows 32 inches apart with approximately 14 inches between seed pieces in the row. Fertilizer was applied at time of planting and as side dressings later in the season in accordance with the best horticultural practice in the area.

Weather conditions during the growing season were very unfavorable. During July, the weather was abnormally hot and the rainfall was below normal. The varieties Cherokee and Canso sprouted poorly under these conditions resulting in poor stands. The weather was unusually wet in August with rainfall exceeding normal by 5.47 inches.

Late blight was not present at any time during the season. Early blight was present in the plots in early August and caused severe defoliation by the end of the season. Severe injury to most of the varieties from early blight infection and the unfavorable weather conditions were responsible for the low yields. (Maryland table 3).

The late potato plots were harvested on November 11 and yield data recorded (Maryland table 2). Yields from seedling B 355-44 and the variety Kennebec were significantly greater than that of Irish Cobbler.

Maryland table 2. Yield record of late potato test plots at the University of Maryland Vegetable Research Farm, Salisbury, Md.

Variety or seedling	Average yield per acre				US #1 to total	US #2 to total	Culls to total
	US # 1*	US #2*	Culls	Total			
	Bu.	Bu.	Bu.	Bu.	Pct.	Pct.	Pct.
B 355-44	176	44	16	237	75	19	7
Kennebec	140	53	19	212	66	25	10
Marygold	97	44	26	167	58	26	16
Keswick	97	29	10	135	72	21	7
Sebago	94	35	12	141	66	25	9
Pontiac	89	40	28	158	57	26	18
B 73-10	79	17	12	108	73	16	11
Katahdin	72	36	23	131	55	27	18
I. Cobbler	61	43	29	133	46	32	22
Yampa	58	46	22	130	46	36	18
Progress	58	16	26	101	58	16	26
1276-185	54	40	30	124	43	33	24
Cherokee	33	10	8	52	64	20	16
Canso	15	6	5	30	58	24	18
L.S.D. at 5%	36.2	24.9	17.9	38.71			
L.S.D. " 1%	48.4	33.4	23.9	51.8			

* U.S. No. 1 and No. 2 equivalent, not officially graded.

Seedling B 355-44 and the variety Sebago showed less injury from early blight as indicated by their defoliation scores in Maryland table 3. The late blight resistant variety Kennebec did not exhibit appreciable resistance to early blight but its yield was as large as any seedling or variety in the test. Yield of seedling B 355-44 was better and contained a higher percentage of #1's (Maryland table 2) than any other variety or seedling with the exception of Kennebec from which it did not differ significantly. Of the 14 varieties and seedlings in the test, only these two produced yields of #1 potatoes which were significantly higher than that of Irish Cobbler. In spite of the low incidence of early blight on Sebago in this experiment, it did not yield as well as Kennebec and seedling B 355-44.

All of the tubers from the plots were examined for scab and *Rhizoctonia* (Black Scurf) when they were harvested. The percentages of healthy tubers and of diseased tubers are shown in Maryland table 3. Of the named varieties in the test, Kennebec, Canso, and Keswick showed a low incidence of scab infection. The latter, however, with no scabby tubers had the highest incidence of *Rhizoctonia* of any of the potatoes in the test.

Maryland table 3. Percentage of defoliation and percentage of healthy and diseased potatoes in the late potato test plots at the University of Maryland Vegetable Research Farm, Salisbury, Maryland.

Variety or seedling	Defoliation			Total tubers		
	9/19	10/2	10/16	Healthy	Scabby	Rhizoctonia
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
B 355-44	4	8	74	86	13	1
Kennebec	15	82	100	91	9	0
Marygold	19	75	100	43	57	0
Keswick	19	85	100	79	0	21
Sebago	4	8	41	88	13	0
Pontiac	33	97	100	69	30	2
B 73-10	9	33	100	83	17	0
Katahdin	24	92	100	88	12	0
I. Cobbler	41	100	100	86	14	0
Yampa	14	21	90	79	21	0
1276-185	37	100	100	90	7	3
Cherokee	12	42	100	90	10	0
Canso	9	50	100	97	3	0
L.S.D. at 5%	12.5	7.0				
L.S.D. at 1%	17.0	10.5				

MASSACHUSETTS
Eastern States Farmers' Exchange
Potato Test Plots 1952
Karl Koch

Four similar plots were planted in four different geographical locations. Each plot was located in a commercial grower's potato field, which he cultivated and sprayed in the same operation as he did his own potatoes. The plot design was of the randomized type, 12 rows wide, 120 feet long, divided into four blocks 30 feet long. Each individual lot consisted of a single 30-foot row.

Three of these plots were located in Pennsylvania and one in Massachusetts. The following paragraphs give the fertilizer and cropping practices followed by each cooperator.

The Clark Brothers farm is located in Westfield, Mass. and has a sandy loam type of soil. The plot was planted on May 8 following a crop of rye that was harvested the previous fall. The land on which the plot was located was fertilized the fall before with 100 pounds of Ammonium Nitrate per acre. At planting time, 1,800 pounds of 8-12-12 L.C. was placed in bands in the row. The plot was dug on October 10.

The Fred Oswald farm adjoins the town of New Tripoli, Pa. The soil on which this plot was planted is of a shaly type. Mr. Oswald follows a 3-year rotation plan on his farm, therefore, the field in which the plot was planted was in sod the previous year. The fertilizer used consisted of a topdressing of 500 pounds per acre with 0-15-30 and 800 pounds of 4-12-16 placed in bands in the row at planting time. The plot was planted on May 13 and dug on October 1.

The Richard Zook farm is in the vicinity of Manheim, Pa., and the field in which the plot was located consisted of a clay loam type of soil. The field containing the plot had a rye cover crop in the fall of 1951, which was plowed down in the late fall with 1,000 pounds per acre of 5-15-15. In addition to the fertilizer plowed down in the fall, 1,200 pounds of 5-15-15 was placed in the row at planting time. The plot on this farm was planted April 22 and dug October 6.

The Richard Bloom farm is located near Ebensburg, Pa., and is made up of a shaly type of soil. The field in which the plot was planted was in clover sod in 1951 and was plowed down in the spring of 1952 with 400 pounds of 8-16-16 per acre. Additional fertilizer was used at planting time with 600 pounds of 8-16-16 per acre being placed in the row with the potatoes. This plot was planted May 16 and dug on October 3.

The yield of U.S. #1 tubers and type of tubers for the four locations are given in Koch table 1. The specific gravity and dry-matter content are given in Koch table 2.

Koch table 1. Yield of U. S. No. 1 tubers and type of tubers produced in four locations in Eastern States territory, 1952.

Variety or seedling	Location, yield U. S. No. 1 per acre, and tuber type									
	Clark	Oswald	Zook		Bloom					
	U.S. No. 1 : Tuber : type:	U.S. No. 1 : Tuber : type:	U.S. No. 1 : Tuber : type:	U.S. No. 1 : Tuber : type:	U.S. No. 1 : Tuber : type:	U.S. No. 1 : Tuber : type:	U.S. No. 1 : Tuber : type:	U.S. No. 1 : Tuber : type:	U.S. No. 1 : Tuber : type:	Average
	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	
B 606-67	592 87	Poor 88	Fair 567 79	Poor 651 93	Fair 585 87					
Kennebec	369 77	Fair 82	Fair 600 82	Fair 622 93	Fair 488 84					
Katahdin	384 89	Good 93	Good 439 91	Good 413 93	Good 437 92					
Pungo	348 83	Fair 90	Fair 326 96	Fair 578 96	Good 436 91					
B 355-44	227 76	Fair 88	Good 563 84	Poor 460 93	Good 418 86					
Cobbler	352 81	Poor 88	Poor 435 81	Poor 423 89	Fair 392 85					
Cherokee	274 74	Fair 69	Poor 346 72	Poor 438 89	Fair 330 77					
B 73-10	244 82	Good 86	Poor 288 84	Good 499 94	Good 329 88					
X 590-7	261 79	Good 82	Good 276 74	Fair 396 90	Good 296 82					
B 515-2	323 85	Poor 75	Poor 309 77	Poor 266 90	Poor 284 81					
B 447-98	255 73	Fair 72	Poor 252 69	Fair 373 90	Good 274 76					
B 402-1	115 46	Fair 60	Fair 183 54	Fair 342 81	Fair 205 62					
L.S.D. 5%	131	96	140	80	59					

Koch table 2. Specific gravity determinations and dry-matter content of potato varieties in four locations, in 1952

Variety	Location, specific gravity, and dry matter									
	Clark		Oswald		Zook		Bloom		Grand Ave.	
	Sp. gr.	Dry mat.	Sp. gr.	Dry mat.	Sp. gr.	Dry mat.	St. gr.	Dry mat.	Sp. gr.	Dry mat.
B 355-44	1.0627	16.0	1.0846	20.7	1.0653	16.5	1.0890	21.6	1.0754	18.7
B 606-67	1.0637	16.2	1.0748	18.5	1.0662	16.7	1.0798	19.7	1.0710	17.7
Pungo	1.0644	16.3	1.0790	19.4	1.0627	16.0	1.0757	18.8	1.0704	17.6
Cherokee	1.0632	16.1	1.0700	17.5	1.0638	16.2	1.0786	19.4	1.0689	17.3
Kennebec	1.0645	16.5	1.0708	17.7	1.0588	15.1	1.0782	19.3	1.0681	17.2
B 73-10	1.0562	14.4	1.0670	17.0	1.0600	15.3	1.0810	19.9	1.0661	16.7
Cobbler	1.0610	15.6	1.0682	17.2	1.0610	15.6	1.0714	17.9	1.0654	16.6
Katahdin	1.0600	15.3	1.0660	16.7	1.0557	14.4	1.0788	19.4	1.0651	16.5
X590-7	1.0621	15.9	1.0704	17.6	1.0486	12.6	1.0746	18.5	1.0639	16.2
B 447-98	1.0585	15.0	1.0582	14.7	1.0581	14.7	1.0699	17.6	1.0612	15.5
B 402-1	1.0590	15.0	1.0612	15.6	1.0428	11.0	1.0690	17.4	1.0580	14.7
B 515-2	1.0545	14.2	1.0555	14.4	1.0496	13.8	1.0644	16.2	1.0560	14.6
L.S.D. 5%	0.0048		0.0118		0.0084		0.0050		0.0029	

The growing conditions at all four locations were unfavorable for good tuber development. Evidently irregular moisture conditions throughout the season were the cause of the misshapen tubers that were produced in all four plots. According to reports from the four areas, the rainfall and temperature were similar in all four places, therefore, the records kept at the Oswald farm would be indicative of the weather at all locations. That the moisture conditions were uneven this season can be seen by this record which shows that following a wet spring there were 32 days from June 5 to July 7 in which there was a rainfall during this entire period of only 0.81 of an inch. Following this dry period there was ample rainfall of approximately 6 inches per month for the next 3 months. Apparently this period of extremely dry weather followed by excessive moisture was at least one factor causing the misshapen tubers.

MASSACHUSETTS

Karol J. Kucinski and Ralph W. Donaldson

Seventeen varieties of potatoes were tested in 1952 for comparative yields at the Massachusetts Agricultural Experiment Station, Amherst, Mass. Tractor and sprayer rows were discarded. Each variety was planted in 200-foot single-row plots. Green Mountain, Irish Cobbler, and Katahdin were triplicated. One-ton-per-acre rate of 6-8-8-2 was used, applied in drill. Plots were sprayed at weekly intervals using 10-5-100 Bordeaux mixture. The 1952 growing season was considered a subnormal potato year. The results of this test are given in Massachusetts table 1.

Mass. table 1. Yield per acre, specific gravity, and dry matter of 17 varieties of potatoes tested in 1952.

Total yield rank	Variety	Yield per acre		Total	Specific gravity	Dry matter	Quality rank
		Size A	Size B				
		Bu.	Bu.	Bu.		Pct.	
1	Chippewa	441	21	462	1.0618	15.7	15
2	Pungo	441	15	456	1.0685	17.2	8
3	Gr. Mountain	420	29	449	1.0801	19.7	1
4	Cobbler	398	31	429	1.0725	18.0	5
5	Teton	402	23	425	1.0687	17.3	7
6	Mohawk	403	14	417	1.0734	18.2	4
7	Katahdin	383	21	404	1.0616	15.7	16
8	Kennebec	378	23	401	1.0718	17.9	6
9	B 606-67	366	24	390	1.0664	16.8	10
10	Ontario	356	23	379	1.0638	16.2	13
11	B 446-8	329	36	365	1.0787	19.4	2
12	Sebago	330	17	347	1.0628	16.0	14
13	B 447-98	264	54	318	1.0650	16.5	11
14	B 515-2	274	32	306	1.0616	15.7	16
15	B 355-44	274	23	297	1.0741	18.4	3
16	Cherokee	225	20	245	1.0668	16.8	9
17	B 73-10	226	14	240	1.0646	16.3	12

MICHIGAN

J. H. Muncie and G. W. Trytten

Scab Resistance: Screening tests were made for scab resistance on approximately 4,000 first-year seedlings produced in the greenhouse from 18 crosses. Parents in these crosses showed no or slight scab infection in previous years. From these, 79 selections were saved for 1953 planting in 5-hill blocks on heavily scab-infested soil.

Field plantings in 5-hill blocks were made of 166 seedlings representing 36 crosses. From these, 37 selections were made for planting in 1953 increase plots on scabby soil. Twenty-five selections of high specific gravity and cooking quality and high scab resistance will be used as parents in greenhouse crosses. Reaction to scab infection of these seedlings is given in table 1:

Muncie and Trytten table 1. Scab resistance tests of 5-hill tuber lots.

Seedlings grown	Seedlings with each type of scab			
	No scab	Type 1	Type 2	Type 3-5
No.	No.	No.	No.	No.
166	9	39	25	93

Resistance to Fusarium solani f. eumartii: Tests of seedlings for resistance to Fusarium solani f. eumartii in 1952 comprised 506 seedlings. These had been selected previously either for resistance to this fungus or were high yielding and of good cooking quality. Most of these were obtained from Professor E. J. Wheeler, Farm Crops Department, Michigan State College.

Results of these tests show only a relatively few seedlings having any great amount of resistance on very heavily infested soil without rotation. Seedlings showing up to 30% infection would probably be acceptable for commercial planting in areas where this disease is present.

Results of the tests for 1950-1952 are given in Muncie and Trytten table 2:

Muncie and Trytten table 2. Resistance to Fusarium solani f. eumartii in 5-hill tuber lots.

Year	Seedlings in each infection class						Total grown
	0-5%	6-10%	11-15%	16-20%	21-25%	26-30%	
	No.	No.	No.	No.	No.	No.	No.
1950	0	2	1	3	2	4	373
1951	3	2	11	11	3	29	464
1952	1	2	8	12	11	14	506

Michigan

E. J. Wheeler and H. C. Moore

The 1952 potato-breeding program in Michigan was very successful. Although it included only the usual techniques involved in previous programs, the results were a little more conclusive. The season in most parts was favorable for a high production. The rainfall varied considerably in different localities. On the plots where the rainfall was deficient supplemental irrigation was available.

Plan of work:

1. Crosses made by using selected parent stock from previous years.
2. Growing of small tubers from hybrid seed in 3-1/2-inch clay pots. in greenhouse.
3. Six-acre increase of seedling No. R136-3.
4. Two-acre plot from seedling tubers grown in greenhouse.
5. Increase plots of all promising seedlings.
6. Late blight test.
7. Scab test.
8. North Central States Potato Breeder and Pathology advanced seedlings yield and performance test.
9. Yield and quality tests on 10 seedlings and varieties.
10. Testing of seedlings for adaptability on muck soils.
11. Provide seedlings for Fusarium eumartii test (Z disease).

Methods:

All material grown in the greenhouse was planted in washed No. 2 plastering sand. The required nutrients were applied by pumping a standard nutrient solution into the hose line and watering the plants with a fine spray.

Mechanical methods were employed wherever and whenever possible to eliminate scarce and expensive labor. Total yields were taken only on the larger yield plots to eliminate the extra time in sizing over a grader.

A 10-tuber sample was sacked from each of the newer seedlings for specific gravity and alcohol test. A 25-tuber sample was saved from each one of the plots for potato chip test.

Results:

Late Blight Test - The late blight test gave the most outstanding results. The seedlings and varieties were planted on June 21 and following planting until harvest the rainfall was in excess. The rainfall was so heavy it was impossible to spray because of the soggy soil. The blight came early and persisted all summer. The earlier planted potatoes in the surrounding area provided the inoculum for an early epidemic on the succulent late-planted seedlings and varieties.

Approximately 336 seedlings and varieties were planted in the test. Many of the susceptible plants were completely killed by the blight before tuber setting. Other seedlings resisted the blight for a time, but later broke down. Cherokee held up very well until late in September when it too showed blight lesions on the leaves. Kennebec grown in the same test didn't have a blight lesion all season.

Seventy-six seedlings and varieties showed no late blight symptoms. Specific gravity and color tests were made on 22 of the blight-resistant seedlings. The results are given in Michigan table 1.

Michigan table 1. Specific gravity and color tests with late-blight-resistant seedlings and varieties.

Seedling or variety	Specific gravity	<u>1</u> /Color
B69-17	1.076	6.0
B69-33	1.085	7.5
B313-21	1.086	7.1
B313-32	1.071	7.9
B529-6	1.068	7.5
B594-52	1.082	6.2
B595-17	1.068	7.4
B595-84-	1.073	7.1
B595-137	1.076	7.5
B596-5	1.074	6.6
B596-52	1.084	7.3
B605-10	1.080	8.0
B608-23	1.066	8.0
R71-7	1.092	7.1
R77-29	1.072	7.4
R82-2	1.082	7.8
R84-10	1.062	7.3
R89-9	1.076	7.9
R97-7	1.066	8.0
R1747-5	1.074	6.5
Kennebec	1.088	7.0
Cherokee	1.084	7.1

1/Alcohol test reading: 8, white; 7-8, slightly gray and lower readings, greater intensity in color.

Potato Chip Tests:

Complete data on the chip analysis in the seedling and variety, date of planting, and irrigation and no irrigation have not been completed. The data of a test with the Russet Rural variety have been completed and Michigan table 2 gives the results.

Michigan table 2. Comparison three dates of planting with Russet Rural variety grown on a farm in Emmet County.

Date of planting	Specific gravity	Chipping score ^{1/}
May 18	1.090✓	10✓
June 2	1.088	8
June 16	1.085	5

^{1/}Score based on 10 white chips and in 1 the chips were a very dark brown color; other scores were intermediate for color.

Normal planting date with the Russet Rural variety in Emmet County has been June 2 - 20. Early planting tests 2 years ago had convinced farmers that an earlier planting date produces better cooking and chipping potatoes. The potato chip companies have used a large quantity of the early planted crop. Until this project was started a very few, if any, of these potatoes were purchased by the potato chip companies.

Seedling Quality Tests:

All 1950 clonal seedling selections and a portion of the 1951 selections were tested for texture and color. The specific gravity was graduated into groups of different specific gravities according to texture culinary quality. The color was determined by the alcohol tests. The results are given in Michigan table 3.

Michigan table 3. Specific gravity and color in 1950 and 1951 clonal selections.

Total seedlings no.	Year	No. above 1.076	No. below 1.070	Color ^{1/} No. with 8 readings
234	1950	48	12	43
122	1951	39	4	20

^{1/} Color reading is based on 8 the best (white), and 1, the poorest quality or dark gray; other numbers between 8 and 1 show other degrees of color.

North Central Region Tests:

The two outstanding seedlings in this test were R136-3 and B515-5. Both of these seedlings had scab resistance. B515-5 has a russet skin. The tuber resembles the Russet Burbank. The advantage over the Burbank is that it is early. A more detailed report of the performance of this test will be given by C. E. Peterson, coordinator for the North Central Region Breeders and Pathologists.

New Introductions Under Test:

Seedling No. R136-3 has been given attention by potato growers due to the high yield and scab resistance obtained. One grower will have a 10-acre increase field in 1953, and several other seed growers will have 3 acres, while others will be planting only a few bushels of seed.

Michigan table 4. Uniform scab nursery, Michigan - 1953

Variety	Color	Replication 1 ¹ / ₂				Replication 2 ¹ / ₂			
		Seedling		Check ² / ₂		Seedling		Check	
		Ar	Ty	Ar	Ty	Ar	Ty	Ar	Ty
B 73-10	W	1	3	2	3	--	--	--	--
B 402-1	W	T	1	1	4	T	1	2	4
B 515-2	Rus	T	1	1	4	T	1	2	4
B 595-76	W	T	1	1	4	T	1	1	4
B 904-6	W	T	2	3	4	1	2	3	4
B 2067-1	R	T	2	2	3	1	3	1	3
B 2131-3	R	1	3	1	4	T	2	2	4
B 2162-18	R	1	1	2	3	1	1	2	3
B 2162-36	R	T	1	1	4	T	1	1	3
B 2162-49	R	T	1	1	3	T	1	T	3
B 2173-22	W	1	2	1	4	1	2	1	4
B 2331-1	R	1	2	1	3	1	2	1	3
B 2340-2	R	1	2	2	3	1	2	1	4
B 2368-6	R	2	2	2	3	1	3	2	3
B 2368-13	R	1	3	2	3	1	4	1	4
B 2369-4	R	T	1	1	4	T	1	1	4
B 2861-1	R	1	2	1	3	1	2	T	3
B 2874-3	R	T	2	1	3	T	2	1	3
B 2874-4	R	1	2	1	4	--	--	--	--
B 2879-4	R	2	2	2	4	T	2	1	4
B 2879-5	R	T	1	1	4	T	1	1	3
B 2879-7	R	T	1	1	4	-	-	-	-
B 2887-2	W	1	3	1	3	2	4	1	4
B 2888-2	W	T	1	1	3	T	4	2	4
B 2892-3	W	1	4	1	4	1	4	1	3
B 2893-11	W	1	4	1	4	1	3	1	4
B 2900-24	W	1	2	1	3	T	2	2	4
B 2900-42	W	T	1	1	3	-	-	-	-

Michigan table 3 continued.

Variety	Color	Replication 1 ^{1/}				Replication 2 ^{1/}			
		Seedling		Check 2 ^{2/}		Seedling		Check	
		Ar	Ty	Ar	Ty	Ar	Ty	Ar	Ty
B 2900-54	W	1	2	1	3	T	1	1	3
B 2914-1	W	-	-	-	-	1	5	2	4
B 2920-13	W	1	3	1	4	1	3	2	4
B 2921-4	W	T	2	1	3	T	1	1	3
B 2921-10	W	1	1	1	3	T	1	1	3
B 2922-15	W	2	3	2	4	2	2	1	2
B 2922-26	W	2	4	2	4	1	4	1	3
B 2922-29	W	1	3	1	4	1	2	1	4
B 2924-2	W	1	3	1	4	1	2	1	4
B 2935-7	W	T	1	1	3	T	1	1	4
B 2968-56	W	1	2	2	3	1	2	2	2
B 2968-66	W	2	4	2	4	1	3	1	3
B 2969-12	W	1	3	T	3	2	3	2	3
B 3003-27	W	T	1	T	3	T	1	1	3
B 3003-26	W	T	3	1	4	1	2	1	4
B 3004-9	W	1	1	1	3	-	-	-	-
B 3008-10	W	1	2	2	3	T	2	3	3
B 3009-7	W	T	1	1	2	T	1	2	3
B 3009-9	W	T	1	1	3	T	1	2	3
B 3014-6	W	1	2	1	3	1	1	1	3
B 3014-15	W	1	1	2	4	T	1	1	4
B 3015-23	W	1	3	2	4	1	2	1	3
Neb. 59.41 PI	R	T	1	1	3	T	1	1	3
N.D. B 2336 NI	W	1	3	2	3	1	3	1	3
N.D. 457-1	W	2	4	1	4	2	4	1	4
M304		1	1	1	1	1	5	3	4
M 330		T	1	1	4	T	1	2	4
M 439		T	1	1	3	T	1	1	3
M 804		T	1	1	4	-	-	-	-
303.41-4		T	1	1	4	T	2	1	4
303.41-40		T	2	T	2	1	2	2	4
Cayuga	W	T	1	1	3	T	1	1	4
Cherokee	W	1	2	1	3	T	1	2	3
Menominee	W	1	2	2	3	1	2	1	3
Ontario	W	T	1	1	3	T	2	1	4
Progress	R	1	3	1	3	1	3	1	3
R. Burbank	Rus	T	1	2	5	T	1	2	4
R. Sebago	Rus	T	1	1	4	2	2	2	4
Sebago	W	1	3	1	3	2	2	1	3
Seneca	W	T	1	1	3	T	1	1	4

^{1/} See footnote in Plant Industry table 11.

^{2/} Check = Kennebec.

F. A. Krantz, F. A. Gown, and Florian Lauer, Department of Horticulture; and
Carl J. Eide, C. E. Logsdon, and H. D. Thurston, Department of Plant Pathology

Seedling Families

Forty-two seedling families, comprising about 3,000 seedlings, were grown at Castle Danger, and a duplicate sample of all but a few families at Grand Rapids. All seedlings were from parentage resistant to either scab, late blight, or Virus X, or to both scab and either late blight or virus X. The seedlings were field tested for resistance to scab or late blight or to both, depending on their parentage, and a total of 346 selections were made for general desirability. These selections will go into initial screening tests in 1953.

Initial Screening Tests

In 1952 this test consisted of 643 selections of which 328 were new selections. These were grown in two replicates. Observations were made on desired plant and tuber types, and tested for resistance to scab, late blight, and virus X, according to resistance in their parentage. Of these 226 were saved for further screening and for preliminary adaptation tests.

Preliminary Adaptation Tests

In 1952 this test consisted of 156 selections. They were tested at 5 locations. Of these 156 selections 8 were saved for regular adaptation tests. The remainder were either continued in the test, placed in the nursery, or discarded.

Adaptation Test

About 50 selections were in this test in 1952, and 16 were selected for further testing. Five of these are being distributed to growers for increase.

Selfed Lines

Thirty-six selfed lines, each of separate origin, were studied in 1952. Of these 17 lines are principally concerned with special horticultural, market, and culinary qualities; 10 are from parents resistant to scab; 6 are from parents resistant to the common race of late blight; 2 are from parents resistant to both the common strain and to the strain of late blight attacking Cherokee and the other varieties resistant to the common field strain; and 1 is from ring-rot-resistant parentage.

Lines of special interest are:

Line 5 was started from a selection of Lookout Mountain x Peerless. This line after four generations of selfing and one of sib crossing breeds true for a trace of scab type 1. An outcross from this line followed by two generations of selfing has given lines that breed true for high resistance to scab. The

Other eight scab-resistant lines are from selections that initially obtained their scab resistance from Hindenburg, Jubel, and Arnica.

Line 10 was started from TI5. It transmits its late blight resistance to about 75 percent of its selfed progeny. Most of the progeny had undesirable characters --late, small leaves, long stolons, odd-shaped tubers. A few resistant types with medium maturity and very acceptable characters were obtained.

Line 58 started from TI5 crossed with an extra early (56-1) has extra early sub lines, with good tuber type and TI5 type resistance to late blight.

The six lines started from parents resistant to the common field race of late blight may be useful for studying the possible effect of increase homozygosity on resistance.

Hybrids

The general procedure followed in the use of selfed lines has been to first combine high scab resistance with good horticultural types, then combine these with parents resistant to virus X and to late blight, then combine parents with resistance to virus X with parents resistant to late blight, with both parents of the cross having sufficient scab resistance to provide an opportunity to obtain segregates with satisfactory scab resistance and resistance to virus X and late blight.

This procedure is based on the observation that adequate transmittal of resistance to late blight and virus X is obtained when one parent of the cross is resistant while to obtain high resistance to scab at least some resistance in both parents of a cross usually is required.

The progress of combining high scab resistance with desired horticultural characters is well advanced. Some of these have the productivity to make good commercial varieties. It is expected to introduce these the coming year if increase in seed stock is satisfactory.

Selections combining desirable horticultural types, scab resistance, and resistance to the common field strain of late blight have been obtained. Since resistance to this strain of late blight appears to be no longer adequate, these selections are probably of less value than the more highly developed scab-resistant selections mentioned above.

Some highly productive horticultural selections have been obtained from crosses of tested adapted selections, Minn. 6 and Minn. 23 with 96-56, and of Minn. 42 with N.B. 1750-18, and an unknown clone mislabeled Empire from Dr. Reddick. The selections from all but the last-mentioned parent have been resistant to late blight in the field test plots, and susceptible to a late blight strain found in the field on Cherokee and Kennebec. A selection obtained from the clone (mislabeled Empire) crossed with Minn. 42 was exceptional in productivity and market and culinary qualities. Menominee, combined with early adapted selections Minn. 42, Waseca, Minn. 23, and Minn. 6, has given vigorous early selections, with high yield, scab resistance between medium 2 and 3, and good over-all desirability. It was used occasionally earlier in the scab-breeding program without obtaining any selections that appear to be worth retaining.

In the last few years the number of new hybrid seedlings grown and harvested in the greenhouse has been reduced from between 7 and 10 thousand to between 3 and 5 thousand. This has been associated with an increasing number of desirable selections and an extension of the screening tests to isolate the most desirable selections.

Notes on Late Blight Resistance

An interesting type of segregation was obtained in two progenies of (TI5 x S. phureja x susceptible S. tuberosum (Minn. table 1). Families 345 and 347 gave more than the expected 1:1 ratio of resistant to susceptible to the Cherokee race of late blight. S. phureja is a susceptible diploid, thus the F_1 presumably had 36 chromosomes and would produce gametes containing 24 and 12 chromosomes. If the latter failed to survive thus a ratio of 2 resistant to one susceptible could be expected.-

A cross between S. demissum and 5-10-1 was made in 1936 for the purpose of transferring some of the apparent frost resistance of S. demissum into tuberosum. The F_1 was crossed with 15-2-10, and the parents and progeny were studied for cold resistance. Laboratory tests of leaves indicated that the tolerance to low temperatures of S. demissum and its derivatives was only slightly higher than S. tuberosum types, and their apparent field tolerance may have been due in part to their more prostrate habit of growth.

Seven plants of this progeny were crossed in 1943 with 5-10-3-23-2 but only Plant 1 was saved as a clone. This clone proved susceptible to the common race of late blight. A seedling test in the greenhouse of the seven crossed families indicated that only Plant 1 of the seven plants did not carry resistance to the Cherokee race^{1/} of late blight (Minn. table 2).

Whether some of the plants were resistant to the other known races of late blight remains to be determined.

Twenty-five F_1 progenies of crosses between 3 strains of S. demissum and 25 selections of S. tuberosum were all resistant to the Cherokee race of late blight. Plans are to test these F_1 progenies and successive backcrosses to the known races of late blight to determine if it is possible to secure S. tuberosum types resistant to those races in successive backcross progenies, and the possible effect of such selection on the rate of recovery of desirable tuberosum types.

1/ The so-called "Cherokee" race was isolated from naturally infected Cherokee plants in 1951. It infects Cherokee, Kennebec, and selections deriving resistance from Müller's W-races, as well as Chenango and Essex, which carry resistance from Solanum demissum.

Minn. table 1. Effect of the susceptible diploid (S. phureja) on segregation for resistance to late blight (Cherokee race)

Family	Parents			Progeny	
	Resistant	Susceptible	Susceptible	Resistant	Susceptible
345	(TI5	x <u>S. phureja</u>)	x 20-20-2-1	49	12
347	(TI5	x <u>S. phureja</u>)	x 44-2	61	30
58	(TI5	x 56-1)	x 77.41-1	13	17

Minn. table 2. Resistance to Cherokee race of late blight in seven plants of the first backcross of S. demissum x S. tuberosum hybrid (S. demissum x 5-10-1) x 15-2-10

Selections from first backcross	Susceptible tuberosum selections		Reaction to late blight	
			Resistant	Susceptible
1	x	5-10-3-23-2	0	10
3	x	"	10	10
4	x	"	11	24
6	x	"	2	3
7	x	"	3	2
13	x	"	0	1
21	x	"	46	31

In Minn. table 3 are recorded blight-damage observations on two plots in different parts of Minnesota. These plots were under the supervision of Dr. O. C. Turnquist and Mr. A. G. Tolaas. They were interesting because of the wide differences in blight damage on varieties only a few of which carry specific resistance to the common field race of Phytophthora infestans.

The plot at Princeton was a single row planted the length of a field next to the variety Cobbler which became heavily infected. There were at least three hills of each selection. This plot was dusted several times. It will be noted that both Kennebec and Cherokee were infected, and a few rods away a field of Cherokee was heavily damaged.

At Fisher the plot consisted of double rows of each variety several rods long. No fungicide was used, but conditions for blight were much less favorable, and commercial fields of Pontiac in the vicinity that were dusted had only a trace of blight. Kennebec and Cherokee were not infected, indicating the absence of races to which these carry specific resistance.

Some of the differences are undoubtedly due to uneven distribution of inoculum, but it is possible that differences in resistance to infection may also be present.

Minn. table 3. Percentage defoliation by late blight of potato clones grown at Fisher and Princeton, Minn.

Selection	Defoliation at:		Selection	Defoliation at:	
	Princeton	Fisher		Princeton	Fisher
	Pct.	Pct.		Pct.	Pct.
Manota	50		B 2969-12	15	
Pl45.12-3	25	T	Nebr. 59.21 Pl	20	
Cherokee	5	0	18169-8	Tr+	
N 439	Tr		B 2340-2	Tr+	
Russet Sebago	10		B 2922-26	10	
Pl45.11-101	10	T	1803-3	5	
M 804	Tr		Cayuga	Tr	
White Cloud	85	90	B 73-10	Tr	
Pl45.11-8	75		ND-457-1	20	40
Mork-1	65		B 3015-23	50	
Sebago	20		B 2368-10	45	
Kennebec	Tr	0	1947-13	5	
303.41-4	Tr		B 2162-36	20	
Chisago	20		B 2067-1	5	
Russet Burbank	5		B 3014-6	25	
Minn. 113-6	5		B 2888-2	60	
M304	25		B 2892-3	Tr+	
303.41-40	Tr		B 3009-9	20	
Minn. 23	Tr+	20	B 2368-13	15	
M330	Tr		ND-B2336NI	Tr-	
B 3014-15	Tr		I872-4	Tr+	
B 2874-4	Tr		I961-1	75	
B 2968-56	Tr		B 2847-21	50	
2879-5	10		B 2893-11	35	
B 2924-2	Tr		B 2131-3	Tr+	
Pl45.3-6	Tr	Tr	B 2921-4	5	
B 2922-15	5		Menominee	Tr+	
B 3004-9	Tr		B 2920-20	Tr+	
B 3003-27	50		B 2162-49	10	
B 2920-13	25		B 2162-18	15	
B 595-76	Tr-		Minn. 113-1	20	T
Progress	50		B 2900-42	Tr	
Ontario	--		B 3008-10	10	
B 2861-1	Tr		B 2331-1	10	
B 2368-6	60		B 904-6	3	
CS6316	35	Tr+	B 2874-3	Tr+	
B 2879-7	5		B 2921-10	Tr+	
B 2900-54	Tr-		Miller seedling	70	
Seneca	Tr+		B 2968-66	10	
B 2914-1	45		Picha Russet 515-2	75	
Minn. 113-8	30	20	B 355-44	Tr+	
NW818(X26-8)	15		B 992-3	0	
B 402	55		B 991-3	Tr+	
B 515-2	30	75	Waseca		30
B 2922-29	25		Red Pontiac		30
I8119-4	5		Triumph		50
B 2369-4	25		Cobbler		75
1976-3	5		LaSoda		50
B 3009-7	50				

MINNESOTA (Duluth)

M. J. Thompson

We think a great deal of the 606-67, which stood up very well. In fact, almost all of the numbered varieties seemed to be superior in their producing capacity with us last year.

Although the yields are not high, they were better than the average of the old varieties in the same field.

Variety or seedling	Yield U.S. No. 1	Total per acre
	per acre	
	Bu.	Bu.
Pungo	100.8	128.3
Houma	166.8	185.1
355-44	119.1	146.6
446-8	89.8	126.5
515-2	80.6	89.8
73-10	132.	144.8
606-67	155.8	174.1
Pungo	155.8	166.8
Houma	49.5	64.1
355-44	133.8	157.6
446-8	137.5	152.1
515-2	82.5	93.5
73-10	99.	115.5
606-67	95.3	111.8

-150-
MINNESOTA
Orrin C. Turnquist

In 1952, 19 varieties of potatoes were included in demonstration plots in Minnesota. Fourteen varieties appeared at all five locations. Three of these locations were on the heavy soils of the Red River Valley, one on peatland at Hollandale, and one on the irrigated sand land area at Brooklyn Center. One hundred pounds of seed of each variety was planted in double rows, making a plot averaging 400 feet in length. The plots were located in commercial fields and the same culture given both. Yields were determined from a 2-rod row within the double rows of each variety.

Turnquist table 1 shows the total yield and percentage U.S. No. 1 size tubers at the five locations in 1952, and in the right-hand column are the average yields for 1951. Kennebec gave the highest average yield of 391 bushels. Not significantly different from Kennebec were P45.11-101, Cherokee, Red Pontiac, La Soda and Irish Cobbler. The selection P45.11-101 is a red midseason variety developed by Mr. Ben Picha of Grand Forks, N. Dak. This selection produced very uniform shallow-eyed tubers with high specific gravity. No scab was evident on P45.11-101 at any of the five locations. Other varieties showing no scab were Cherokee, B 515-2, Minn 113-1, Minn 113-8 and CS6316. The selection B 515-2, an early russet, produces a high percentage of misshapen and growth-cracked tubers, whereas CS6316 developed a considerable amount of hollow heart at Hollandale, Brooklyn Center, and Baker. Minn 113-1 was superior to Minn 113-8 in producing tubers of excellent market quality. Both the Red Bliss Triumph, and the Bliss Triumph were considerably lower in yield in 1952 compared with 1951. Kennebec and Cherokee were high yielding both years.

Specific gravity values of varieties grown in 1952 are presented in Turnquist table 2. Approximately 80 varieties and selections were grown in 3-hill rows at 3 locations where scab has been a problem. Susceptible varieties were grown in adjacent rows for comparison. The scabbiest tuber from each variety and the scabbiest tuber from the adjacent check hill were sent to Beltsville for scab readings and are reported in Turnquist table 3.

[illegible]

Turnquist table 2. Specific gravity values of potato varieties tested in 1952.

Variety	Hollandale	Brooklyn Center	Baker	Fisher	Donaldson	Ave. for locations
	Dry matter	Dry matter	Dry matter	Dry matter	Dry matter	
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Cherokee	20.1	18.7	23.5	19.7	21.3	20.7
N.D. 457			21.8	19.7		
Red Warba			20.3			20.3
C.S. 6316	17.7	17.7	22.5	17.9	21.2	19.4
Kennebec	17.5	17.3	21.2	19.9	19.9	19.2
Pl45.11-101	17.7	17.5	19.2	20.3	20.7	19.1
White Cloud	19.0	15.5	21.6	18.9	20.5	19.1
Red Triumph			20.2		17.9	19.1
I. Cobbler	16.3	16.7	20.3	19.2	21.3	18.8
Bliss Triumph			20.5	16.7	18.9	18.7
Pl45.12-3				17.9		17.9
Minn. 113-1	15.9	less than 15	19.5	19.5	19.7	17.7
Pl45.3-6	15.6	" " "	19.5	19.7	18.6	17.5
Minn 23	16.9	" " "	19.0	17.4	19.2	17.5
La Soda	15.5	" " "	19.9	17.4	18.2	17.0
Waseca	15.0	" " "	17.9	17.9	19.9	16.9
B 515-2	15.6	" " "	18.2	16.7	18.2	16.7
Red Pontiac	less than 15	" " "	19.2	17.0	17.7	16.5
Minn. 113-8	" " "	" " "	18.4	17.3	17.5	16.3

Turnquist table 3. Uniform Scab Nursery, Minnesota - 1952

Variety	Color	Princeton (Peat) 1/				Amoka (Peat) 1/			
		Seedling		Check 2/		Seedling		Check 3/	
		Ar	Ty	Ar	Ty	Ar	Ty	Ar	Ty
B 73-10	W	T	2	T	1	T	2	3	5
B 402-1	W	T	1	T	1	T	1	4	5
B 515-2	Rus	T	1	1	3	T	1	4	5
B 595-76	W	T	1	T	1	1	2	3	5
B 904-6	W	T	1	T	2	1	3	3	5
B 2067-1	R	T	3	1	3	3	3	4	5
B 2131-3	R	T	1	T	4	4	4	4	5
B 2162-18	R	T	2	T	2	1	1	2	5
B 2162-36	R	T	1	T	1	1	2	4	5
B 2162-49	R	T	1	T	1	T	1	4	5
B 2322-26		1	3	1	3	-	-	-	-
B 2331-1	R	T	1	T	3	T	1	4	5
B 2340-2	R	T	1	T	1	2	5	3	5
B 2368-6	R	T	1	T	2	2	5	4	5
B 2368-10		T	1	T	1	2	3	4	5
B 2368-13	R	1	3	1	4	2	4	3	5
B 2369-4	R	T	1	T	1	4	5	4	5
B 2847-21		1	3	1	3	2	4	3	5
B 2861-1	R	1	1	1	3	2	4	3	5
B 2874-3	R	1	4	T	4	1	4	3	5
B 2874-4	R	T	1	T	2	1	4	4	5
B 2879-5	R	T	2	T	1	1	1	3	5
B 2879-7	R	T	1	T	1	2	2	4	5
B 2888-2	W	T	1	1	2	3	3	4	5
B 2892-3	W	T	4	T	2	2	5	4	5
B 2893-11	W	T	2	T	3	3	4	4	5
B 2900-42	W	-	-	-	-	1	2	4	5
B 2900-54	W	T	1	T	1	1	2	3	5
B 2914-1	W	T	2	T	1	1	5	3	5
B 2920-13	W	T	1	T	2	2	4	4	5
B 2920-20	W	T	1	T	1	1	2	4	5
B 2921-4	W	T	4	T	4	1	3	4	5
B 2921-10	W	T	1	T	2	2	4	4	5
B 2922-15	W	T	1	T	1	3	3	4	5
B 2922-26	W	-	-	-	-	3	5	4	5
B 2922-29	W	T	2	T	1	3	3	4	5
B 2924-2	W	T	1	T	3	3	3	4	5
B 2966-56	W	T	1	1	2	3	3	3	5
B 2968-66	W	1	2	1	3	1	3	3	5
B 2969-12	W	T	2	T	2	1	5	4	5
B 3003-27	W	T	1	T	1	1	1	4	5
B 3004-9	W	T	1	T	1	3	4	3	5
B 3008-10	W	1	2	1	4	1	4	4	5
B 3009-7	W	T	1	T	1	1	3	4	5
B 3009-9	W	T	1	T	1	T	1	4	5
B 3014-6	W	1	4	T	1	1	4	4	5

Minnesota table 3 continued.

Variety	Color	Princeton (Peat) ^{1/}				Anoka (Peat) ^{1/}			
		Seedling		Check ^{2/}		Seedling		Check ^{3/}	
		Ar	Ty	Ar	Ty	Ar	Ty	Ar	Ty
B 3014-15	W	-	-	-	-	T	1	3	5
B 3015-23	W	T	1	T	4	1	1	2	5
Neb. 59.41 PI	R	T	1	T	3	1	1	3	5
N.D.B 2336N1	W	T	1	T	2	3	4	4	5
N.D. 457-1	W	1	1	T	1	2	4	4	5
M 304		T	1	T	1	1	2	3	5
M 330		T	1	T	1	T	1	3	5
M 439		-	-	-	-	1	2	4	5
M 804		1	2	1	4	1	2	2	5
303.14-8		-	-	-	-	1	5	4	5
303.41-4		T	1	T	3	T	1	4	5
303.41-40		T	1	T	2	-	-	-	-
Minn 23		-	-	-	-	4	5	4	5
Minn 113-1		T	1	1	4	1	2	4	5
Minn 113-6		T	1	T	1	1	1	3	5
Minn 113-8		T	1	T	1	T	1	3	5
Minn 5.33-5-34		T	1	T	4	3	5	4	5
NW 818(x26-8)		1	2	1	4	T	1	3	5
P 45.3-6		T	1	1	3	4	5	4	5
P 45.11-1		-	-	-	-	1	1	4	5
P 45.11-8		T	1	T	1	-	-	-	-
P 45.11-101		T	1	T	1	1	3	3	5
P 45.12-3		-	-	-	-	3	5	4	5
CS 6316		T	1	1	4	1	2	4	5
I 803-3		1	3	T	1	2	2	4	5
I 872-4		T	1	1	3	T	1	3	5
I 947-13		T	1	T	1	T	1	3	5
I 976-3		T	1	T	1	1	3	4	5
I 961-1		1	3	T	1	4	5	4	5
I 8119-4		T	1	T	1	2	3	3	5
I 8169-8		T	1	1	3	T	1	4	5
Cayuga	W	T	1	1	3	T	1	3	5
Cherokee	W	T	2	T	1	2	2	4	5
Chisago		1	4	1	4	4	5	4	5
Kennebec	W	1	3	1	4	3	4	4	5
Manota		1	4	1	4	2	2	3	5
Menominee	W	T	1	1	3	T	1	4	5
Ontario	W	-	-	-	-	T	1	4	5
Progress	R	2	3	T	1	-	-	-	-
R. Burbank	Rus	1	4	T	2	3	3	4	5
R. Sebago	Rus	T	2	T	2	1	2	2	5
Sebago	W	-	-	-	-	2	2	3	5
Seneca	W	T	1	T	1	2	2	4	5
White Cloud		T	1	T	2	-	-	-	-

^{1/}See footnote in Plant Industry Table 11.

^{2/}Check at Princeton = Irish Cobbler

^{3/}Check at Anoka = Pontiac

MISSISSIPPI

W. S. Anderson, W. F. Jenkins, and E. L. Phillips

Irish potato plantings at the Coastal Plain Branch Experiment Station, Newton, Miss., were made on March 6 and harvested on June 25. Fifteen numbered lines and three named varieties, Bliss Triumph, Kennebec, and La Soda, were planted in five replications. Cold, wet soil during March resulted in a poor stand of most lots. After emergence, the plants obtained very little rainfall until the first week of June.

On June 25, with the cooperation of Dr. T. P. Dykstra, observational notes were made on all lots. The potatoes were then plowed out and observational notes were made on the tubers. Although yield records were taken on all plots having a fair stand of plants, the yields were too low to be of any value and are not included in this report.

Despite the hot dry weather, some of these seedlings produced attractive tubers of good size, blocky, and no heat sprouts. The following seedlings were particularly noticeable in these respects: 336, 368, 658, 1393, 127-46-1, 209-43-1, 213-43-2, 311-43-1, and LD-82-65. With the exception of some heat sprouts, the following lots produced acceptable tubers: 1345, 1404, 1859, 213-43-3, and La Soda.

An effort will be made in 1953 to get a satisfactory test of most of the lots planted this year. A well-drained site has been selected for the plots to protect the seed tubers from the hazards of a cold, wet planting season. It is hoped that facilities for irrigation will be made available for protection against drought conditions.

Trial at Bozeman: Seven varieties of potatoes were planted in a replicated trial at Bozeman in 1952. Two additional varieties, small quantities of cut eyes of which were made available, were also planted.

Seed was cut on May 8, 1952, but due to inclement weather and wet soil conditions, it could not be planted until May 22, 1952. Plots were single rows, 25 feet long and $3\frac{1}{2}$ feet apart and the seed pieces were spaced 12 inches apart in the row. Planting was done with an Iron Age assisted-feed planter, and about 200 pounds 10-20-0 per acre was applied through the planter. Irrigation was applied as needed by means of a perforated aluminum pipe sprinkling system until the third week of August, when irrigation was stopped. The plots were dug on September 17. The vines had been damaged by frost prior to digging. The tubers were placed in storage and the data, Montana table 1, were obtained during the first half of November.

Mont. table 1. Total mean yields and U.S. No. 1 tubers, also number of tubers, specific gravity, and total solids for potato variety trial
Bozeman, Mont. 1952.

Variety	Total yield per plot	U.S.#1 yield per plot	U.S. No. 1 tubers	U.S. No. 1	Mean tuber weight	No. 1 yield per A	Specific gravity	Total solids
	Lbs.	Lbs.	No.	Pct.	Oz.	Cwt.		Pct.
Netted Gem	65	54	121	83.5	7.2	270	1.110	26.3
Triumph	81	76	180	94.6	6.8	380	1.103	26.0
Cherokee	75	66	156	88.0	6.8	330	1.103	26.0
P 45.11-101 ^{1/}	78	72	155	92.3	7.4	240	1.096	26.0
P 45.11-6 ^{1/}	73	68	165	92.7	6.5	340	1.085	25.8
P 456.8-1 ^{I/}	55	50	143	89.7	5.6	250	1.097	26.0
B 515-2	58	55	103	94.8	8.5	275	1.082	20.0
Canso ^{2/}	58	53	116	91.4	7.3	265	1.088	25.9
Columbia Russet ^{2/}	64	52	107	81.2	7.8	260	1.103	24.5
L.S.D. 5%	N.S.	N.S.	40				0.013	
1%	N.S.	N.S.	N.S.				0.019	

^{1/} Produced by Ben Picha, Grand Forks, N.D.

^{2/} Single plots. L.S.D's not applicable.

Analysis of the data for the replicated trials shows that there were no significant differences in either total or No. 1 grade yields. All varieties except Netted Gem produced significantly higher counts of No. 1 tubers than did B 515-2, which had the lowest mean count.

Netted Gem was the only variety with a specific gravity significantly above the general average, and it is interesting to note that Netted Gem also had a specific gravity highly significantly greater than that of B 515-2 which resembles it in appearance. B 515-2 had the lowest specific gravity of any variety in the trial, a point distinctly not in its favor. None of the varieties in the trial had specific gravities high enough to make them serious competitors of Netted Gem from the quality standpoint, although all the gravities were at a high level this year. The specific gravities reported here were determined by weighing the water displaced by a 10-pound sample of tubers.

In the field, it was noted that Cherokee seemed to have a good plant habit--erect bushy vines --that all the Picha selections produced a considerable quantity of seed balls, and that Canso had exceptionally large leaflets.

None of the varieties on trial appeared to have qualities that would make them serious competitors of Netted Gem or Bliss Triumph, as the case might be. If B 515-2 had quality equal to that of Netted Gem, it might be of considerable interest, due to its somewhat earlier maturity. (Mont. table 1)

Trial at Northwestern Montana Branch Station, Creston: Sixteen varieties of potatoes were planted in a replicated trial at Creston in 1952. This trial was grown by C. W. Roath, Superintendent of the Branch Station at Creston. Plots were of the same dimensions as those at Bozeman and were planted on June 2. Irrigation was supplied by a sprinkler system. The plots were dug on September 23, and the data obtained are presented in Mont. table 2.

Analysis of the data shows that La Soda, Canus, and Cherokee produced yields significantly greater than that of Netted Gem, the standard variety in the Flathead area, but these three varieties scabbed too heavily to be of commercial value.

Only Netted Gem, B 515-2, and Cayuga were significantly free of scab to warrant further consideration. Of these, Netted Gem is probably the only one with sufficient quality to be commercially worthwhile in the area. (Mont. table 2).

Mont. table 2. Yields in pounds per plot and cwt. per acre, together with disease and quality notes for potato variety trial, Northwestern Montana Branch Station, Creston, Montana, 1952.

Variety	Mean per plot		Scab <u>1/</u>	Size <u>2/</u>	Type <u>3/</u>
	Lbs.	Cwt.			
1. Canus	81	405	H	M	S
2 Early Rose	79	393	H	M	R
3. Erie	69	343	H	M	S
4. B 515-2	60	297	N	M-L	S
5. Netted Gem	63	314	N	M-L	S
6. Progress	67	335	H	S	S
7. Cayuga	61	304	L	S-M	S
8. Katahdin	63	314	H	L	S
9. Euclid	67	333	M-H	M	S
10. La Soda	93	461	VH	L	S
11. White Cloud	74	367	H	M	S
12. Bliss Triumph	73	363	H	M-L	S
13. Yampa	69	342	M-H	L	CRH
14. Kasota	71	357	H	M	S
15. Waseca	70	347	VH	L	S
16. Cherokee	87	431	M-H	L	RC
L.S.D. at 5%	17	85			

1/ H = Heavy; M = Moderate; L = Light; N = None; VH = Very heavy.

2/ M = Medium; L = Large; S = Small.

3/ S = Smooth; C = Cracks; R = Rough; H = Hollow.

Trial at Eastern Montana Branch Station, Sidney: This trial, which included 11 varieties, was grown by Glenn Hartman, Superintendent of the station at Sidney. Three replications of each variety were planted on May 29, 1952, in plots 0.00153 acre in size. Rows were 40 inches apart, with the hills spaced 12 inches apart in the row. The row length used was 20 feet. One surface irrigation was applied on July 30. The plots were dug on September 29, 123 days after planting, and the data obtained are presented in Montana table 3. Unfortunately, Bliss Triumph was not included in this trial; it is the standard variety in much of eastern Montana.

Using Netted Gem as the check variety, it will be seen that none of the varieties in the trial produced yields significantly greater than it did. However, Katahdin, White Cloud, Ashworth, Irish Cobbler, Erie, and Cayuga produced yields highly significantly less than that of Netted Gem. The yield for 456.8-1 should probably be disregarded, since only about a 35-percent stand was obtained with this variety. It is worth noting that B 515-2 performed relatively much better at Sidney than at Bozeman, and was rated less knobby than netted Gem.

Ashworth produced significantly fewer tubers than did Netted Gem, while Katahdin, White Cloud, Irish Cobbler, Erie, and Cayuga produced highly significantly fewer tubers than Netted Gem.

None of the varieties produced significantly smaller tubers than Netted Gem, but Cherokee produced significantly larger tubers and B 515-2, White Cloud, and Erie produced highly significantly larger tubers.

While the scab infection in the trial this year was apparently quite mild, Netted Gem, Cayuga, Cherokee, Katahdin, and Erie were rated in the two upper classes for scab resistance. B 515-2 showed moderate resistance.

It seems probable that B 515-2 shows as much promise as any of the varieties in this trial.

Montana table 3. Yield per acre, mean tuber weight, scab index, skin color, knobbiness, and uniformity of size of 11 varieties of potatoes grown at the Eastern Montana Branch Station, Sidney, Mont., in 1952.

Variety	Mean yield per acre	Mean tuber weight	Scab index <u>1/</u>	Skin color	Knobbi- ness <u>2/</u>	Uniformity of size
	Bu.	Lb.				
Cherokee	646	0.52	4	White	3	Fair
B 515-2	639	.53	3	Russet	2	Fair
P 45.11-101	648	.47	3	Red	1	Poor - many small
P 456.8-1	181	.41	3	Russet	1	Good
Katahdin	483	.49	4	White	1	Fair
White Cloud	307	.53	2	"	1	Good
Ashworth	579	.53	3	"	1	Fair
Netted Gem	637	.45	5	Russet	3	"
Irish Cobbler	394	.50	2	White	1	Poor
Erie	564	.55	4	"	1	Fair
Cayuga	388	.43	5	Russet	2	Poor
Mean	497	.48				
LSD 5% point	30.0	0.06				
LSD 1% "	40.0	.08				

1/ Scab index: 1 = Large number medium to large lesions.
 2 = " " of small lesions.
 3 = Moderate number of small lesions.
 4 = Few scattered small lesions.
 5 = Little or no trace of scab.

2/ Knobbiness: 1 = No knobs
 2 = Occasional tuber with knobs.
 3 = Knobs on numerous tubers.

NEBRASKA

H. O. Werner

(Active participants, Robert O'Keefe and Lionel Harris)

The complete program from seed production to variety introduction was conducted as in recent years. The number of clonal lines carried was greater than ever because of the inability in 1951 to distinguish between the lesions due to flea beetle larvae and those caused by the scab organism. This difficulty was partially dealt with in 1952 by planting all lots in five different plats in one of which the soil was sprayed with Aldren before planting at the rate of one-half pound per acre. This treatment very effectively prevented flea beetle damage to tubers and did not appear to have had a deleterious effect on the growth of either the potato plant or the scab-causing organisms. The incidence of scab was very low in some of the replicates on land where scab is usually very severe, so we are still carrying an excess of material that requires further screening. However, in view of the consistency in the low amount and mild types of scab occurring on many of these red-tuber lines we believe that a considerable number of them will show worth-while resistance when scab occurs with greater severity and to the extent that is frequently experienced in western Nebraska. Many of these lines are good commercial types because of skin color, tuber type, harvest handling quality, good interior color, and high specific gravity. We have high hopes to get a dependable test in 1953 that will permit thorough screening.

Field Trials of Advance Lines and New Varieties

The summation of replicated yield and observation tests conducted at 15 places in 1952 is given in Nebr. tables 1 to 6. Tubers of advance lines have been supplied for cooperative tests in several other States; and we have participated in the uniform tests of the North-Central States, which are reported elsewhere.

1953 Nebraska Introductions

Four red-tuber lines were released to a few growers for commercial increase in 1952. Two of these are being recommended for naming and introduction this winter. These two, with the respectively proposed names in parenthesis, are the following:

213.43-2 (Sheridan) and 213.43-3 (Dazoc). Both of these have the following pedigree:

		(Minn. 4-25 (U.S.D.A. 14329 selfed)
	(Minn. 29.32-1-34	(
	(	(Minn. 41-1 (Early Ohio selfed)
(49.40-3	(	
(	(	(Lookout Mountain
(	(Minn. 5-10-3-23-2	(
213.43(		(Peerless
(		
(		
(Triumph		

Nebr. table 1. Bushels per acre U.S.#1 - A size potatoes

Line No. or variety	Location and yield U.S.#1 - A per acre				
	Western Nebraska		Central Nebraska		Eastern Nebraska Non-Irrig. ^{1/}
	Irrigated 7 plats	Dryland 4 plats	Irrigated 2 plats	Dryland 1 plat	

1953 Introductions

	Bu.	Bu.	Bu.	Bu.	Bu.
213.43-3	215	94.4	412	61.0	333
213.43-2	284	63.3	247	6.6	169

Advance lines being increased (all red skin)

209.43-1	352	66.5	314	9.7	232
204.43-1	252 <u>5/</u>	70.2	269	47.8	186
26.44-1	246	110.6	308	37.1	242
189.45-6	350 <u>6/</u>	34.2 <u>3/</u>	398	22.3	302
89.46-2	190	95.8	139	24.9	115
127.46-1	199	57.6	298	8.8	260
154.47-2	373 <u>2/</u>	98.2 <u>2/</u>	211	--	142

Standard Varieties

Triumph	205	77.9	--	47.2	--
White Cloud	144	81.8	329	60.7	273
Progress	279	88.4	--	70.5	--
LaSoda	173	90.2	327	116.8	213
Red Pontiac	380	91.3	265	72.4	204
Red Warba			354	14.2	165

Scab resistant - white varieties

Cayuga	290	75.6	--	25.7	--
Cherokee	138	80.6	112	38.5	82
Menominee	216 <u>3/</u>	78.0 <u>3/</u>	221	--	188
Russet Sebago	214 <u>4/</u>	91.2 <u>3/</u>	--	--	--
Pungo			309	--	206

^{1/} - ^{6/} Numbers given are number of plats for mean when different from the number shown at top of column.

Nebr. table 2. Percentage U. S. #1 - A Size

Line No. or variety	Location and percentage U.S.#1 - A per acre				
	Western Nebraska		Central Nebraska		Eastern Nebraska Non-Irrig. 1/
	Irrigated 7 plats	Dryland 4 plats	Irrigated 2 plats	Dryland 1 plat	

1953 Introductions					
	Pct.	Pct.	Pct.	Pct.	Pct.
213.43-3	51.9	62.0	40.3	56.7	49.9
213.43-2	60.2	41.3	36.3	29.3	31.0

Advance lines being increased (all red skin)

209.43-1	66.0	39.9	37.6	23.5	46.6
204.43-1	55.0 <u>5/</u>	51.8	40.4	24.9	45.8
26.44-1	54.4	66.4	46.7	26.6	29.2
189.45-6	56.3	51.2	47.6	47.1	63.0
89.46-2	60.0	59.2	31.9	63.0	38.8
127.46-1	47.8	50.3	48.6	38.4	68.6
154.47-2	74.7 <u>2/</u>	58.0	29.4	20.6	67.4

Standard Varieties

Triumph	40.0	47.8	--	--	--
White Cloud	41.1	67.3	37.4	32.8	73.5
Progress	60.7	59.7	--	--	--
LaSoda	31.4	51.8	36.5	50.0	16.1
Red Pontiac	48.7	60.3	48.7	62.5	46.7
Red Warba	--	--	44.5 <u>1/</u>	14.2	74.1

Scab resistant - white varieties

Cayuga	65.6	50.2	--	--	--
Cherokee	43.7 <u>6/</u>	70.8	53.3	32.0	11.2
Menominee	64.4 <u>3/</u>	54.9 <u>3/</u>	38.7	61.8	71.4
Russet Sebago	69.5 <u>4/</u>	61.0 <u>3/</u>	--	--	--
Pungo	--	--	46.8	19.5	28.6

1/ - 6/ Numbers given are number of plats for mean when different from the number shown at top of column.

Nebr. table 3. Mean Specific Gravity (Values shown are Specific Gravity - 1.000 x 1000).

Line No. or variety	Location and Mean Specific Gravity				
	Western Nebraska		Central Nebraska		Eastern Nebraska Non-Irrig. <u>1</u> /
	Irrigated 7 plats	Dryland 3 plats	Irrigated 2 plats	Dryland 1 plat	

1953 Introductions

213.43-3	77.3	84.9	81.3	82	68.0
213.43-2	80.4 <u>6</u> /	89.2	81.1	90	60.2

Advance lines being increased for introduction

209.43-1	66.5	80.2	72.8	67	55.2
204.43-1	73.0 <u>5</u> /	79.1	74.4	75	55.1
26.44-1	83.6	91.0	83.7	83	63.2
189.45-6	80.6 <u>6</u> /	89.7 <u>2</u> /	83.9	82	69.8
89.46-2	73.7	91.6	69.9	81	54.8
127.46-1	81.6	89.8	82.1	81	66.5
154.47-2	81.9 <u>2</u> /	86.1	77.8	70	65.2

Standard Varieties

Triumph	75.1	80.8	--	--	--
White Cloud	76.5 <u>3</u> /	81.1 <u>1</u> /	80.7	84	62.6
Progress	77.2	85.9	--	--	--
LaSoda	68.9 <u>1</u> /	87.1 <u>1</u> /	76.4	83	57.4
Red Pontiac	61.0 <u>1</u> /	68.3 <u>1</u> /	70.6	70	55.5
Red Warba	--	--	76.1	86	62.6

Scab resistant - white varieties

Cayuga	83.0	103.8	--	--	--
Cherokee	70.7 <u>2</u> /	72.4 <u>1</u> /	69.0	74	56.9
Menominee	67.3	74.8 <u>1</u> /	74.1	65	55.3
Russet Sebago	--	86.2 <u>1</u> /	--	--	--
Pungo			84.4	--	70.8

1/- 6/ Numbers given are number of plats for mean when different from the number shown at top of column.

Nebr. table 4. Mean percentage A size tubers sorted out for scab.

Line No. or variety	Location and mean percentage A tubers sorted out				
	Western Nebraska		Central Nebraska		Eastern Nebraska Non-Irrig. ^{1/}
	Irrigated 7 plats	Dryland 4 plats	Irrigated 2 plats	Dryland 1 plat	

1953 Introductions

213.43-3	23.5	9.2	4.2	1.6	7.9
213.43-2	23.5	7.5	1.8	0	7.5

Advance lines being increased for introduction (all red skin)

209.43-1	16.4	4.4	2.6	2.3	1.4
204.43-1	50.5 <u>3/</u>	18.8	4.1	8.2	0
26.44-1	29.9	13.0	3.2	0	5.6
189.45-6	23.3 <u>6/</u>	4.1 <u>6/</u>	.4	0	.2
89.46-2	7.8	5.9	2.0	0	0
127.46-1	34.9	22.8	3.6	0	.6
154.47-2	4.7 <u>2/</u>	13.2 <u>2/</u>	4.2	0	0

Standard Varieties

Triumph	32.5	7.9	--	--	--
White Cloud	43.5	15.3	2.4	0	0.2
Progress	7.5	3.4	--	--	--
LaSoda	48.5	20.4	6.2	0	0
Red Pontiac	24.8	7.8	0	0	0
Red Warba	--	--	4.8	0	0.5

Scab resistant - white varieties

Cayuga	1.7	0.4	--	--	--
Cherokee	1.1 <u>6/</u>	0	0	0	0
Menominee	7.7 <u>4/</u>	0	1.2	0	0
Russet Sebago	3.4 <u>4/</u>	4.1 <u>3/</u>	--	--	--
Pungo	--	--	0	0	0

^{1/} - 6/ Numbers given are number of plats for mean when different from the number shown at top of column.

Nebr. table 5. Mean percentage A size tubers too rough for U.S.#1 Grade.

Line No. or Variety	Location and mean percentage A tubers too rough for U.S.#1				
	Western Nebraska		Central Nebraska		Eastern Nebraska Non-Irrig. ^{1/}
	Irrigated 7 plats	Dryland 4 plats	Irrigated 2 plats	Dryland 1 plat	

	1953 Introductions				
	Pct.	Pct.	Pct.	Pct.	Pct.
213.43-3	7.8	9.3	2.5	11.1	7.4
213.43-2	3.3	5.7	1.6	18.1	5.7

Advance lines being increased for introduction

209.43-1	6.0	1.1	3.1	10.2	9.8
204.43-1	5.0 <u>5/</u>	7.4	1.4	7.4	20.0
26.44-1	3.7	2.7	9.3	18.7	19.4
189.45-6	3.4 <u>6/</u>	14.0	9.6	13.7	16.2
89.46-2	15.6	15.7	7.4	17.9	0
127.46-1	2.4	1.6	1.7	13.9	1.7
154.47-1	4.8 <u>2/</u>	12.6 <u>2/</u>	4.7	--	2.6

Standard Varieties

Triumph	13.3	30.2	--	--	--
White Cloud	6.7	1.2	.5	3.0	0
Progress	18.9	11.7	--	--	--
LaSoda	4.5	10.6	18.3	--	26.8
Red Pontiac	16.0	17.8	13.2	--	23.3
Red Warba	--	--	17.9	17.5	2.2

Scab Resistant Varieties

Cayuga	17.4	10.3	--	--	--
Cherokee	4.8 <u>6/</u>	16.1	35.5	39.5	57.3
Menominee	4.8 <u>3/</u>	19.4 <u>3/</u>	3.7	--	9.1
Russet Sebago	6.8 <u>4/</u>	13.0 <u>3/</u>	--	--	--
Pungo	--	--	1.5	--	0

^{1/} - ^{6/} Numbers given are number of plats for mean when different from the number shown at top of column.

Nebr. table 6. Mean Percentage of rotten potatoes, at sorting time, due to field frost.

Line No. or variety	Western Nebraska	
	Irrigated 7 plats	Dryland 4 plats

1953 Introductions

	Pct.	Pct.
213.43-3	7.4	1.2
213.43-2	6.3	13.9

Advance lines being increased for introduction (all red skin)

209.43-1	5.2	2.5
204.43-1	5.1 <u>4/</u>	.4
26.44-1	5.3	.6
189.45-6	.9 <u>6/</u>	2.9
89.46-2	11.1	3.5
127.46-1	10.9	14.0
154.47-1	3.8 <u>2/</u>	1.4 <u>2/</u>

Standard Varieties

Triumph	2.9	.3
White Cloud	2.8	1.4
Progress	4.9	1.6
LaSoda	10.2	2.5
Red Pontiac	6.1	2.8

Scab resistant - white varieties

Cayuga	3.3 <u>6/</u>	3.2
Cherokee	1.4 <u>6/</u>	.3
Menominee	2.0 <u>3/</u>	0
Russet Sebago	4.2 <u>4/</u>	1.0

1/ - 6/ Numbers given are number of plats for mean when different from the number shown at top of column.

Both are round bright red (considerably darker than Triumph), eyes are relatively shallow, tubers are generally medium in size - usually not as large as Triumph but with fewer small tubers than Progress. The tubers crack little or not at all at harvesttime being superior to Triumph but inferior to Progress in that respect (see tables 1 - 6). Both have high culinary quality and make very good chips. Yields in western Nebraska have been equal to those of Triumph or better but perhaps not as great as those of Progress. In central Nebraska yields have been inferior to those of Red Warba but the market quality has been far superior. Tubers are not resistant to scab, but in that respect they are at least on a par with all the other red varieties now available except Progress. The percentage of rough and second-growth tubers, etc., has been distinctly lower than that for Progress, Triumph, and Red Pontiac.

The two lines differ in the following respects:

213.43-3 (Dazoc) differs from 213.43-2 (Sheridan) in being a second instead of a third early in season and in ^{not} having quite as bright color. The percentage of rough tubers is usually likely to be higher because of a tendency for some tubers to have deep apical eyes and sometimes a cleft apical end. With irrigation in western Nebraska yields of 213.43-2 are generally the highest but on dryland in western Nebraska and with or without irrigation in the eastern or central part of the State 213.43-3 has been most productive.

It is thought that 213.43-3 may be preferable in central Nebraska irrigated areas to Red Warba because of much greater possibilities of having potatoes of superior market quality. In western Nebraska both varieties may be preferable to Triumph because of appearance, lack of harvest cracking, and culinary quality.

The two other red lines increased in 1952 were 209.43-1, which is being continued on a pre-introductory basis for another year, and 20.44-2, which is being discarded because of the great propensity for rough tuber production and the low culinary quality of the tubers.

Advance Lines Being Increased (See tables 1 - 6)

The advance red tuber lines listed in Nebr. tables 1 to 6 were increased at the Box Butte and Scottsbluff Experiment Stations in western Nebraska in 1952 and will be increased still further so that stocks for farmers will be available in 1954. It will be noted that some of these produce tubers of high specific gravity, some are highly productive, with a high percentage of U.S.#1 - A size tubers. One of them (154.47-2) appears to possess some scab resistance. Several very promising white lines with scab resistance are being increased on a smaller scale.

Test of Standard Red-Skin Varieties

Red Pontiac continues to be the most productive red tuber variety. It also produces the largest tubers of any. The serious difficulty with it is that the large tubers are more likely to be rough with deep eyes and sometimes

excessively large. A very serious defect is the usually low culinary quality as shown also by the very low specific gravity - usually the lowest in any comparative test.

LaSoda is less productive than Pontiac, and the tubers while large are not quite as large. Culinary quality is usually quite good. The color is of course a much paler red. On dryland in western Nebraska it is probably preferable to Triumph and may have merit in eastern Nebraska.

Progress has been replacing Triumph in western Nebraska. The reason is obvious in the tables - greater yields of #1 tubers because of less scab and less mechanical injury and better culinary quality. It is also more satisfactory for the new mechanized harvesting practices.

Test of Scab-Resistant Varieties

Among the several scab-resistant varieties now available Cayuga seems most promising in western Nebraska. Yields and maturity are usually satisfactory, scab resistance is very high, and specific gravity is consistently relatively very high wherever and whenever it is grown. It has been used extensively in Nebraska crosses and has netted segregates of splendid tuber type, many of which appear to have high scab resistance. Growers with scab-infested soils are interested in it but as stocks do not seem to be available commercially anywhere in the country we are increasing it in Nebraska and maybe into sizable commercial production in 1954 unless something occurs to dampen or discourage interest.

Menominee is always highly productive and relatively scab-free, but while the tubers are not as rough as in some areas, the market appearance is only fair, some of the tubers are hollow, and culinary quality is quite ordinary.

Cherokee has been tested for several years during all of which it has shown very high scab resistance but it invariably has produced a high percentage of of rough, knobby, and growth-cracked tubers. The interior color is very good and specific gravity is fair. In 30 field tests, it has been rated as commercially acceptable only 6 times, and in only 1 of those tests was it rated higher than barely acceptable. It is of course still preferable to Russet Burbank, a variety some farmers have been trying to raise in western Nebraska in 1952.

Pungo was included in the early areas in 1952 and in 12 observation tests in the last 3 years. The tubers are large, scab is seldom a matter of concern, yields are very good, interior color is good, but general desirability is only fair because of great frequency of hollow heart and considerable growth cracking.

Potato Chip Quality

Some of the red-skin lines have been found to make excellent potato chips, a characteristic apparently associated in the minds of commercial chip manufacturers only with white potatoes. Grouping of lines from which chips of

acceptable or better quality were made, October, 1952, was as follows:

Excellent	Superior	Good	Acceptable
33.48-4*	204.43-1	120.40-6*	
	213.43-2		
	213.43-3	43.46-2*	Triumph
148.48-3 (Dazoc)	26.44-1	59.48-1	
	189.45-6	315.48-3*	
	43.47-1*	Cayuga *	
Irish Cobbler*			
	118.47-1*	Kennebec*	
	95.48-1		
	401.48-1	LaSoda	
	20.48-1*	White Cloud*	
	223.48-1*		
	Katahdin*		

* White-skin lines; all others have red skin color.

Observations of Other New Varieties or Selections

Chisago can always be depended upon to produce high yields of large tubers, but they are usually too rough, because of sunken lateral eyes, to warrant commercial production.

Kennebec, except under the most favorable conditions - which for it apparently rarely occur in western Nebraska, produces tubers that are pointed and/or concave at the stem end and sungreening occurs too frequently.

LaSalle is productive, but tubers are highly susceptible to scab and knob production.

Pawnee does not seem to have attained the recognition it warrants for production in areas where common scab is not serious. It produces smoother potatoes of large size and good culinary quality than any other early variety available.

Satapa produces tubers of beautiful type but because of the great potentiality for growth cracking and hollow heart it is too hazardous to consider for commercial growing.

Snowdrift has tremendous potentialities for high yields of medium-size very uniform smooth white tubers. Its potentialities will probably not be appreciated in Nebraska unless conditions are suitable for yields in excess of 600 bushels per acre.

Yampa always yields well and sometimes the crop is very acceptable, but usually the tubers are too rough, have many growth cracks, or may be hollow, Scab resistance is dependable.

U.S.D.A. B515-2 has consistently produced large scab-free tubers but rarely are of 50% of them commercially acceptable because of the high percentage of very knobby tubers or deep large growth cracks. The interior color is usually fair and specific gravity is medium.

Waseca is productive but the color is not satisfactory and sometimes eyes are deep and tubers are rough.

White Cloud seems to be well suited for production on the Carolina Coastal Plains. It is also gaining recognition for baking and chip making.

Among red tuber lines 44.43-6-45 from Minnesota produces good yields of large good type light-red tubers of fair interior quality but with no scab resistance and sometimes they are hollow. North Dakota 45-11-10 is very promising. Nebraska 59.41-Pl is useful as a parent for high scab resistance producing many segregates with red tubers, fairly good interior quality, and acceptable type.

Interspecies Crosses

Progenies were grown in 1952 from 19 families of which hybrids of S. tuberosum by S. chacoense were used as one of the parents and S. tuberosum varieties the other. Many of the segregates produced unusually high yields of tubers of commercially acceptable size and quality. These progenies will be observed further and tested especially for resistance to scab and Colorado potato-beetle susceptibility. Some crosses involving S. demissum and S. polyadenium hybrids are contemplated for the 1953 program.

Variety Differences in Relative Turgidity of Leaves (Field Work by Joan M. Wallace)

The leaf turgidity studies described in the 1951 report were continued in April through June of 1952. When growing during the protracted hot dry weather of late May and early June of 1952 leaves of all varieties recovered to show much the same relative turgidity percentage during the early morning but great differences occurred in varieties throughout the day. Leaves of Triumph were desiccated more rapidly and to a lower percentage of relative turgidity than those of any of the other five varieties. Leaves of Pawnee were affected least by high atmospheric vapor deficits. Of the middle group of varieties, Irish Cobbler, Progress, Red Warba, and LaSoda, the Irish Cobbler was the more resistant to water loss and Progress the least resistant.

The soil moisture had a great influence on relative turgidity values but not as great as that of the atmospheric vapor deficit. The R. T. at any time was closely associated with vapor deficit as measured by the amount of water lost from a black atmometer during the previous hour. There was a similar relationship, though not as close, between accumulative vapor deficit, that is, the amount of water loss from a black atmometer between sunrise and 3:00 p.m., when the minimum diurnal values usually occurred.

Leaves of varieties that suffered very serious desiccation by late afternoon (down to 75% R.T.) on hot windy days near the close of a protracted heat and drought period were able to regain morning R.T. values of 97% to 98% when soil

moisture was replenished by irrigation. These morning values were very similar for all varieties. However, these recently irrigated plants did not have the ability to retain a comparably high R.T. level in midday throughout ensuing hot days. Several days were required after irrigation until these plants did not suffer a severe R.T. depression in hot dry days.

An effort is being made to determine the morphological characteristics that are associated with the ability to retain high R.T. and thereby keep the plants in photosynthetically high condition more hours of the day.

Correction of the Previously Announced Source of Progress

Apparently a regrettable error was made when the field note book was made up in the winter of 1940-41. Then the number 24.48-3 inadvertently came into use instead of 21.48-3 the true number of Progress. According to our 1939 note book no seedlings were raised from the cross 24.38 and all descriptions prior to 1941 for tubers of 21.48-3 harmonize with the description of 24.38-3 in later years.

The erroneous pedigree previously announced was:

		(Lookout Mountain
	(Minn. 5-10-3-8	(
Progress	(	(Peerless
(24.38-3)	(	
	(	
	(Pontiac	

The correct pedigree and initial number is the following:

		(Lookout Mountain
	(Minn. 5-10-3-8	(
	(	(Peerless
Progress	(	
(21.38-3)	((	
	(	
	(	(S45075 (Earlaine)
	(U.S.D.A. 0183	(
		(Katahdin
		(S44537((
		(Chippewa

NEVADA
Otto R. Schulz

In Lyon County, Chippewa, Teton, and B 69-16 far outyielded the standard variety Russet Burbank in the production of U.S. No.1 tubers. In Washoe County the variety Mohawk was first in a group of 5. However, in Elko County Triumph far outyielded the other two varieties in the weight of No. 1 potatoes produced. The data for these tests are given in Nevada table 1.

Nev. table 1. Potato variety tests in Lyon, Washoe, and Elko Counties.

Variety	Total	Yield per acre			Grade percentage		
		US No. 1	US No. 2	Culls	No. 1	No. 2	Culls
<u>Lyon County</u>	Ton	Ton	Ton	Ton	Pct.	Pct.	Pct.
Chippewa	28.3	16.1	9.3	2.9	56.9	32.8	10.3
Sebago	21.8	0	12.1	9.7	0	55.5	44.3
B 355-35	21.4	9.2	6.5	5.7	42.8	30.6	26.6
B 606-67	21.3	5.2	13.9	2.2	24.6	65.2	10.2
Teton	19.2	13.5	4.9	1.4	68.4	24.6	7.0
B 69-16	19.9	14.9	3.6	.5	78.2	19.1	2.7
R. Burbank	17.7	9.1	6.5	2.2	51.2	36.5	12.3
B 446-8	16.3	9.1	3.7	3.5	55.6	23.1	21.3
B 515-2	13.9	5.3	7.8	.8	37.7	56.5	5.8
Cayuga	13.3	6.0	4.9	2.4	44.8	37.2	18.0
B 920-7	11.0	3.6	4.1	3.3	32.5	37.7	29.9
<u>Washoe County</u>							
Mohawk	13.2	10.0	.9	2.3	75.8	6.6	17.6
Pungo	11.7	7.0	2.0	2.7	60.3	17.1	22.5
B 355-44	9.8	8.0	.8	1.0	81.5	8.3	10.2
B 351-44	7.8	3.9	1.9	2.0	50.0	24.4	25.6
96-44	5.8	3.7	.9	1.2	63.2	14.9	21.9
<u>Elko County</u>							
Triumph	28.0	21.8	3.2	3.0	77.5	11.6	10.9
96-56	27.2	13.6	1.8	11.8	49.8	6.7	43.5
B-447-98	21.1	13.3	3.0	4.8	62.9	14.4	22.7

Red Warba) Not weighed. Good yields of large potatoes but very badly scabbed
Pontiac) and very watery.

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NEW HAMPSHIRE
Paul T. Blood

The land on which these potatoes were grown(N. H. table 1) was not suitable for the dry season that we had. Therefore, the yields are much lower than usual. The fertilizer application was 2,100 pounds of 5-10-2.

N. H. table 1. Planted in Madbury, N. H., May 9, 1952. Very hot during July and August. 1952 potato variety trials, New Hampshire Agricultural Experiment Station.

Variety or seedling	Yield per acre, specific gravity, and percentage of starch				
	#1 size	#2 size	Variety or seedling	Specific gravity	Starch
	Bu.	Bu.			Pct.
Kennebec	447	20	Gr. Mountain	1.0889	15.8
*B 606-67	424	37	B 932-9	1.0885	15.75
Teton	407	18	B 355-44	1.0822	14.4
*Green Mountain	399	35	Mohawk	1.0815	14.3
B 355-44	381	13	Yampa	1.0805	14.0
Houma	370	63	Russet Burbank	1.0782.	13.5
Yampa	342	19	Cherokee	1.0777	13.4
Chippewa	324	27	Houma	1.0768	13.3
Russet Sebago	316	16	B 606-67	1.0759	13.0
*Russet	315	79	Kennebec	1.0746	12.8
*Cherokee	307	48	Cobbler	1.0739	12.6
Ontario	307	53	B 73-10	1.0733	12.5
B 73-10	294	13	Russet	1.0733	12.5
Katahdin	287	17	Russet Sebago	1.0733	12.5
Mohawk	256	3	B 447-98	1.0727	12.4
Pawnee	249	52	Sebago	1.0725	12.3
**Russet Burbank	246	52	Ontario	1.0715	12.1
B 932-9	241	85	Teton	1.0705	11.9
Cobbler	229	41	Katahdin	1.0689	11.6
Sebago	226	15	Chippewa	1.0657	10.9
B 447-98	224	45	Pawnee	1.0647	10.7

*Some second growth

**Badly misshapen

NEW JERSEY
John C. Campbell

Three tests were conducted on private farms in central New Jersey. The test on the Spencer Perrine farm, Cranbury, Middlesex County, was planted on April 10. The test area was in wheat in 1951. This was combined and the straw left on the field. The plots were 85 feet long, and 2 rows wide and were planted with a high speed 2-row Iron Age planter. Twenty-one hundred pounds of a 5-10-10 fertilizer per acre were placed in bands at the sides of the sets. Because excessive rainfall during May leached out nitrogen and magnesium the test area received four 25-pound applications of magnesium sulfate and 3 25-pound applications of Nu-Green, which were sprayed on the plants at 7- to 10-day intervals during June. Each variety was replicated 4 times.

June and July were very dry and warm and this was believed responsible for the development of some heat sprouting of tubers in August and serious soft rot of the tubers of some varieties. A 1/120 acre section was harvested for yield records from each replicate.

In addition to the named varieties 22 seedlings secured from the U.S.D.A., Presque Isle, Maine, were tested; however, only one plot of each was planted. The few plants still alive at harvest on September 10 were destroyed with a Roto-beater a few days before harvest. The data for the Middlesex County tests are given in New Jersey tables 1 and 2.

The test on the Franklin Scott farm, near Cranbury, in Mercer County, was planted on April 18 in duplicate plots. Approximately 1,200 pounds of an 8-16-16 fertilizer was applied in band at planting time. One-half of each replicate was irrigated 5 times during June and July. One inch of water was applied at each application. The test was harvested on October 2. All plants were practically dead at harvest. The plots were two rows wide and 300 feet long. Two 1/120 acre plots were harvested for yield records from both the irrigated and non-irrigated areas. The data for the Mercer County tests are given in New Jersey table 1.

The test on the Ketcham Brothers farm at Freehold in Monmouth County was planted on April 19 and approximately 1,600 pounds of an 8-16-16 fertilizer was placed in bands at planting. Only one plot of each variety was planted, the plots being two rows wide and approximately 500 feet long.

The plants were killed in mid-August before any of the late-season plants had matured, and this procedure undoubtedly reduced the yields of these varieties. The test was harvested on September 26. A plot 1/60 acre in size was used for yield records.

All plots were cultivated and sprayed according to the grower's practices.

There was considerably more rain at the Monmouth County location than at the other locations and this resulted in higher total and U.S. No. 1 yields. The data for the Monmouth County tests are found in New Jersey table 1.

New Jersey table 1. Potato variety trials 1952.

Variety	Seed source	Yield per acre 1/		
		U.S. No. 1	U.S. No. 1	Dry matter 4/
		Pct.	Bu.	Pct.
<u>Mercer County</u>				
<u>-(irrigated)</u>				
Chippewa #20	Wis.	61(1)	331	15.0
La Soda	"	65(2)	323	16.3
Chippewa #18	"	73(3)	354	15.2
Teton	Me.	67(4)	334	15.5
Essex	"	38(5)	193	15.5
Chippewa	"	82(6)	378	14.9
Katahdin #49	Wis.	85(7)	388	16.7
Kennebec (Fdn.)	Me.	70(8)	351	16.7
Green Mountain	"	44(9)	220	18.5
Katahdin	"	75(10)	314	16.0
Pungo	USDA	64(11)	271	18.0
Cobbler #29	Wis.	69(12)	308	17.2
Canoga	N.Y.	62(13)	263	15.7
Cobbler	Me.	69(14)	241	17.9
Snowdrift	N.Y.	68(15)	260	16.5
Sebago	Me.	78(16)	317	15.5
Cherokee	USDA	56(17)	183	15.9
Mohawk	Me.	88(18)	336	17.7
Chenango	N.Y.	71(19)	196	16.7

- | | | |
|------------------------|---------------------------------|--------------------------|
| (1) 10% scab | (7) 5% B's, 2% growth cracks | (13) 8% B's, 17% rot |
| (2) 15% B's 13% rot | (8) 13% B's, 8% rot | (14) 19% B's, 6% knobby |
| (3) 12% Scabby | (9) 34% knobby, 14% rot | (15) 23% B's, 8% knobby |
| (4) 15% B's 10% knobby | (10) 10% B's, 10% rot | & green |
| (5) 38% knobby | (11) 15% knobby & growth cracks | (16) 11% B's, 8% growth |
| (6) 10% B's | (12) 10% B's, 16% knobby | cracks & knobby |
| | | (17) 13% B's, 15% knobby |
| | | 8% rot |
| | | (18) 5% B's, 5% growth |
| | | cracks, 0 rot |
| | | (19) 20% B's, no off |
| | | grades or rot. |

<u>Mercer County</u>		1/	4/
<u>(not irrigated)</u>			
Chippewa #20	Wis.	61(1)	256
La Soda	"	53(2)	215
Chippewa #18	"	67(3)	310
Teton	Me.	61(4)	244
Essex	"	41(5)	154
Chippewa	"	77(6)	288
Katahdin #49	Wis.	70(7)	261
Kennebec (Fdn.)	Me.	59(8)	252
Green Mountain	"	46(9)	169
Katahdin	"	69(10)	252
Pungo	USDA	66(11)	238

Variety	Seed source	Yield per acre <u>1/</u>		
		U.S. No. 1	U. S. No. 1	Dry matter <u>4/</u>
Mercer County continued (not irrigated)		Pct.	Bu.	Pct.
Cobbler #29	Wis.	50(12)	195	16.0
Canoga	N.Y.	75(13)	168	16.7
Cobbler	Me.	67(14)	221	15.5
Snowdrift	N.Y.	67(15)	218	16.3
Sebago	Me.	71(16)	180	16.8
Cherokee	USDA	47(17)	144	18.0
Mohawk	Me.	79(18)	222	18.4
Chenango	N.Y.	70(19)	155	15.5

Difference between mean yields not significant.

- | | |
|---------------------------------------|----------------------------------|
| (1) 15% scab and knobby | (10) 19% B's |
| (2) 21% B's 4% rot, 19% knobby | (11) 14% knobby & growth cracks |
| (3) 11% scabby | severe rot |
| (4) 17% B's, 8% rot | (12) 19% B's, 25% knobby |
| (5) 11% B's, 39% knobby | (13) 15% B's, 5% rot |
| (6) 14% B's | (14) 16% B's, 13% knobby |
| (7) 10% B's, 8% growth cracks, knobby | (15) 20% B's, 6% knobby |
| (8) 17% B's, 12% rot | (16) 14% B's, 8% odd shape |
| (9) 26% knobby, 15% rot | (17) 25% B's, 11% knobby, 8% rot |
| | (18) 7% B's, 4% growth, 0 rot. |
| | (19) 24% B's, 4% knobby, 1% rot. |

Middlesex County

Chippewa #20	Wis.	51(1)	^{2/}	220	less than	^{4/} 15.0
La Soda	"	63(2)		297		15.7
Chippewa #18	"	52(3)		215	less than	15.0
Teton	Me.	58		193	" "	"
Essex	Me.	39(4)		147	" "	"
Chippewa	"	-		-		-
Katahdin #49	Wis.	71		290		16.3
Kennebec (Fdn.)	Me.	58(5)		213		15.0
Green Mountain	"	54(6)		186		18.1
Katahdin	"	-		-		-
Pungo	USDA	59(7)		172		17.2
Cobbler #29	Wis.	66(8)		183		17.9
Canoga	N.Y.	63		244		15.9
Cobbler	Me.	70		209		18.5
Snowdrift	N.Y.	62(9)		161		18.5
Sebago	Me.	71		288	less than	15.0
Cherokee	USDA	54(10)		142		17.5
Mohawk	Me.	73		242		16.5
Chenango	N.Y.	70(11)		173		17.9

- | | |
|------------------------|----------------------------------|
| (1) 11% scab | (7) 14% rot, 10% cracks & knobby |
| (2) 10% rot, 3% knobby | (8) 23% B's |
| (3) 15% scab | (9) 27% B's |
| (4) 42% knobby | (10) 29% B's |
| (5) 11% rot | (11) 22% B's |
| (6) 19% knobby | |

L.S.D. 5% level 50.2 bushels
 " 1% " 67.0 "

New Jersey table 1 continued

Variety	Seed source	Yield per acre ^{3/}			Dry matter ^{4/}
		U.S. No. 1	U.S. No. 1		
		Pct.	Bu.		Bu.
<u>Monmouth County</u>					
Chippewa #20	Wis	83	358	less than	15.0
La Soda	"	85	354	" " "	
Chippewa #18	"	67(1)	251	" " "	
Teton	Me.	79(2)	320	" " "	
Essex	"	74(3)	255	" " "	
Chippewa	"	87	365		15.5
Katahdin #49	Wis.	90	306		15.0
Kennebec (Fdn.)	Me.	88(4)	297	less than	15.0
Green Mountain	"	72(4)	238		16.0
Katahdin	"	90	320	less than	15.0
Pungo	USDA	76(5)	298		15.8
Cobbler #29	Wis.	82(6)	281		17.3
Canoga	N.Y.	85	274		15.2
Cobbler	Me.	82(7)	266		19.0
Snowdrift	N.Y.	85	283		16.3
Sebago	Me.	88	251	less than	15.0
Cherokee	USDA	68(8)	256	" " "	
Mohawk	Me.	89	231		15.7
Chenango	N.Y.	79(9)	265		17.3

- | | |
|-------------------------------|-------------|
| (1) 10% scab | (6) 15% B's |
| (2) 15% B's | (7) 14% B's |
| (3) 15% B's, 9% knobby | (8) 21% B's |
| (4) 16% knobby | (9) 16% B's |
| (5) 13% knobby, some sprouted | |

1/ 2 replicates

2/ 4 "

3/ 1 replicate

4/ Average 15 tubers

Very low percentages of U.S. No. 1 quality were found in the samples removed for grading, especially from the tests in Middlesex and Mercer Counties. The samples were not graded until approximately 6 weeks after harvest and excessive amounts of soft rot had developed in some varieties and this greatly affected the percentage of U.S. No. 1 quality tubers in many instances. The rot in most cases was of a very wet consistency eventually consuming the entire tuber. Some was similar to jelly end-rot.

Specific gravity determinations were made on 15 uniformly sized tubers from each variety from each of the tests. These specific gravity data were converted to dry matter content. It will be noted that the average dry matter of these samples is somewhat lower than is usually the case for ^{the} varieties. We believe this to be due to a large degree to the hot and dry weather that prevailed. (New Jersey tables 1 and 2)

New Jersey table 2. Yield and dry-matter content of 22 numbered varieties grown in Middlesex County, N. J., 1952.

Seedling number	Yield per acre ^{1/}		Dry matter	Remarks
	U.S. No. 1	U.S. No. 1		
	Pct.	Bu.	Pct.	
B 606-67	52	236	17.2	21% B's, 14% knobby, 8% rot*
B 637-14	55	216	15.7	14% B's, 20% cracked & knobby, 7% rot
B 926-9	71	268	16.3	12% B's, 12% rot
B 355-44	44	154	17.6	18% B's, 30% knobby
B 355-35	63	219	17.3	17% B's, 10% rot
B 69-16	75	247	16.5	13% knobby, 7% B's, skin russeted
B 446-8	53	173	15.0	26% B's, 6% rot, sprouted, poor appearance
B 962-16	68	194 less than	15%	13% cracks off shape, severe russet
B 605-10	---**	--	--	
B 351-44	46	124	16.5	32% B's, 8% knobby
B 73-10	68	158	16.3	16% B's, 9% rot
X96-56	77	173	18.3	17% B's, 1% rot, skin netted, very good appearance
B 962-3	84	188	18.3	11% B's, no off grades, skin heavily netted
B 922-3	65	144 less than	15%	14% B's, slight to severe russet
B 922-6	---**	--		
B 725-8	51	101	15.0	25% B's, 10% knobby & cracked, Many tubers pear shaped
B 2140-21	58	98	16.5	30% B's, no rot
B 773-8	68	113	17.4	25% B's, skin slightly russeted
B 2067-18	63	101 less than	15%	22% B's, 2% rot, 7% knobby, smooth skin
B 920-7	57	85	17.0	Spongy, 26% B's, 10% knobby & cracked
B 991-3	79	109	17.6	15% B's no off grades, skin russeted, good shape
B 381-2	40	-- less than	15%	40% B's, 1% rot, spongy, seed had a stem end rot.

* Most rot believed due to Fusarium, rot is very watery and consumes entire tuber or maybe only at stem end as jelly end rot.

** Part of sample lost

^{1/} 1 replicate

A sample from each variety from each location will be tested for taste, color, and consistency when boiled and mashed. We hope to get some information regarding the relative table quality of the various varieties. However, the poor growing conditions may affect quality to such a degree that our findings will not be of great value. The samples will be prepared by members of the Food Technology Department of Rutgers University and the taste panel will be composed of members of the staff of the College of Agriculture.

The outstanding varieties from the standpoint of total yields were Chippewa #20 (Wis.), LaSoda (Wis.), Chippewa #18 (Wis.), Teton (Me.), Essex (Me.), Chippewa (Me.), Katahdin #49 (Wis.), and Kennebec (Me.). Those with highest yields of U.S. No. 1 quality were Chippewa, Katahdin #49, LaSoda, Katahdin, Chippewa #20, and Chippewa #18.

The varieties with the highest average specific gravity were Green Mountain, Cobbler, Pungo, Cobbler #29, Mohawk, and Snowdrift.

Essex, Cherokee, Green Mountain, and Cobbler #29 produced the lowest percentage of U.S. No. 1's. These varieties are not well adapted to severe drought conditions. The Essex produced an average of only 48% U.S. No. 1's.

The differences between the mean yields in the three tests cannot be given the same value because no replicates were planted in one test, another was planted in duplicate, and the third was replicated four times.

The seedling yields varied greatly and the highest total yields were produced by Seedlings B 606-67, B 637-14, B 926-9, B 355-44, B 355-35 and B 69-16. It is of interest to note however, that several of these high-yielding seedlings produced very low percentages and yields of U.S. No. 1 quality tubers. Seedling B 355-44 produced only 44 percent U.S. No. 1's and B 606-67, 52 percent. These seedlings produced large percentages of knobby and small tubers and, as indicated in the table, several other seedlings are not adapted to hot dry growing conditions. Seedling B 962-33 although not producing a very high yield produced a relatively high percentage (84) of U.S. No. 1 quality tubers.

It is interesting to note the differences in varietal response to irrigation in the test on the Scott Farm. Irrigation increased the total yields of Essex, Green Mountain, Chippewa #20, and Teton 133, 133, 123, and 98 bushels per acre, respectively, and several other varieties produced yield increases ranging from 50 to 90 bushels per acre. The increases of U.S. No. 1's in some instances were even greater. Varieties showing relatively little response in total yield were Cobbler, Kennebec, and Cherokee; however, the Kennebec did produce a large increase of U.S. No. 1's due to irrigation.

New York (Ithaca)

William C. Kelly, R. V. Akeley and F. J. Stevenson

Breeding Potatoes for High Vitamin C. Content

This project is entering its fifth year on an encouraging note. The early years were spent evaluating the varieties and breeding materials that were available in Maine. When possible, the progenies of various crosses were studied to determine the breeding behavior of various materials. A definite program was initiated in 1951 on the basis of the preliminary work. A seedling (B2098-29) had been found to maintain an exceptionally high ascorbic acid content after 4 months storage at 40°F. On the basis of preliminary work, 5 varieties representing high, low, and medium ascorbic acid contents were selected and crossed with the seedling B2098-29. Selfed progenies from all of these materials were also obtained. Single-hill plantings from these crosses were harvested in Maine in 1952. The analyses completed after 4 months storage disclosed large differences between the progenies.

The number of seedlings from each cross exceeded 200 in most cases, so that more than 2,400 seedlings were sampled. The range in ascorbic acid content of the entire population was from 5 mg/100 g. to 30 mg/100 g. The progeny of B 2098-29 selfed had by far the highest mean ascorbic acid content. In fact, more than 100 of the seedlings had a higher ascorbic acid content than the 30 commercial varieties that were sampled for comparison. Of the other progenies studied, Katahdin selfed produced more seedlings in the high range than the others. The progenies lowest in ascorbic acid were from Teton selfed and B 607-56 selfed. Crossing these varieties with B 2098-29 resulted in progenies with a higher ascorbic acid content than when the varieties were selfed, with one exception.

Selections have been made of seedlings with high ascorbic acid content to continue the breeding program to determine how high the upper limit is.

The progress to date is illustrated as follows:

Mohawk	x	B 355-24	
13 mg/100 g.		10 mg/100 g.	
	↓		
B 2098-29	x	Self	
20 mg/100 g.			
	↓		
		KB 1377 - 1	
		30 mg/100 g.	

The ascorbic acid contents are those from the 1952 crop stored for 120 days at 40°F.

In spite of a rather unusual season the potato yield was good. It was dry until planting time on May 9, then there was a period of normal rainfall for about 10 days. No more precipitation occurred until around the middle of July when a 2-day storm left 4 inches of rain. From that time until long after harvest the rainfall was below normal.

The search for an early-maturing, high-quality, heavy-yielding, disease-free potato continues. The Canoga is less susceptible to leaf roll than some varieties, is of very good quality, and is high yielding and late maturing. At this time we are trying to introduce earliness without losing any of the other desirable characters of the Canoga.

Many lines in our plantings exhibit some degree of resistance to the potato leafhopper and tarnished plant bug. Probably these resistance factors have come from Solanum chacoense, which now appears at least once in the pedigree of most of our seedlings and in many instances it occurs two or more times. This season several lines maintained green tops until September 22 when we killed the vines.

It would seem that there is still need for someone to develop an adequate test for leaf roll immunity. Two or three years ago one of our seedlings was subjected to the caged-viruliferous-insect test and subsequently showed no indication of leaf roll, yet last year when this same seedling was indexed in the greenhouse there were several very obvious leaf roll plants. Until such time as more positive tests are provided we shall have to depend upon observation when the tubers are indexed and the appearance of the plants when grown in the field.

Some of our seedlings have been free from leaf roll, so far as indexing can show the disease, for 2 years. When grown in the field these same lines produce plants with flat, non-rolling leaflets. It has been reported that S. chacoense is resistant to leaf roll. Perhaps these seedlings have retained a gene, or two, for leaf roll resistance, since S. chacoense germplasm is in many of them. B 24-58, from Dr. Folsom, is being used also as parental stock wherever possible. For over 10 years this strain of B 24-58 has never produced a leaf roll plant, either in the field or when indexed in the greenhouse at Ithaca.

A few seedlings outyielded the checks by more than 15 percent. Among these are two in particular that produce attractive tubers of high eating quality. In addition, one line is quite resistant to leafhopper damage and the other appears to have considerable resistance to leaf roll. If these two continue to exhibit these desirable qualities they will be introduced in the winter of 1953.

New York

M. W. Meadows, J. Howard Ellison and R. L. Sawyer

Title: Specific gravity and yields of potato varieties and seedlings in New York, 1952.

Project leaders: M. W. Meadows, J. Howard Ellison, and R. L. Sawyer.

Importance of problem: There is a great need on the high lime mineral and muck soils of New York for a more desirable scab-resistant potato than Ontario. The variety, although a heavy producer, is extremely susceptible to black spot or pressure bruise.

Disease-resistant varieties with better table and market quality are needed in the early and maincrop varieties.

Objects: To test varieties and seedlings for adaptability, yield of marketable potatoes, market quality, table quality, and disease resistance.

Plan of work: A total of 16 seedlings, new and old varieties, were tested in 6 counties of up-State New York and 2 counties on Long Island. Trials consisted of 5 replications, each replication consisting of 40 hills spaced 9 inches apart. Total yields are recorded in Meadows table 1.

Samples for specific gravity determinations were taken from 3 replications and determinations made with a potato hydrometer. No determinations were made for Wayne County. These data are presented in Meadows table 2.

Results: Of the early varieties, there was no great difference in yield response. Keswick and Cherokee gave a generally higher specific gravity reading than Cobbler or B 447-98. Tubers of B 447-98 were russeted and of nice appearance. Keswick produced nice looking tubers. Cherokee tended to be rough under the adverse growing conditions of 1952.

Of the midseason and late varieties, Kennebec continued to produce a large crop of tubers which are often rough and oversize. B 606-67, a heavy producer, was susceptible to heat sprouting, producing many rough tubers. B 73-10 compared favorably with Katahdin in tuber appearance but seldom surpassed it in yield.

Canoga performed satisfactorily in the two trials where it was planted.

The remainder of the varieties or seedlings were undesirable because of low yields or undesirable tuber characteristics. The 1952 growing season was very hot and dry, being ideal for testing a variety's adaptability to adverse growing conditions.

Meadows et al. table 1. New York potato variety trials, 1952.

County and total yield per acre									
Variety	^{1/} Nassau	Suffolk	Erie	Niagara	Wayne (muck)	Franklin	Genesee	Monroe	Variety Ave.
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
<u>Early</u>									
I. Cobbler	230	433	274	426	451	461	414	291	372
Keswick	263	470	330	352	229	597	416	323	372
Cherokee	250	386	292	296	478	466	368	278	352
B 477-98	232	324	231	382	402	501	359	336	346
<u>Midseason</u>									
Kennebec	621	502	423	427	565	608	632	361	517
Placid	410	487	321	376	462	603	397	338	424
Katahdin	332	503	312	428	486	517	421	338	417
Pungo	379	487	356	338	546	486	430	289	414
B 73-10	210	397	280	326	418	541	439	275	361
F 4519	361	312	254	-	390	-	367	284	328
F 451	292	319	258	339	281	512	370	234	326
Canso	203	-	289	261	339	417	307	-	303
Pontiac	-	587	-	-	-	-	-	-	-
New White	-	-	-	-	-	474	-	-	-
<u>Late</u>									
B 606-67	372	595	414	417	505	661	579	468	501
Gr. Mountain	450	430	359	395	491	624	548	431	466
B 446-8	377	355	318	349	430	488	463	359	392
B 355-44	392	360	330	241	461	486	325	315	364
Canoga	-	-	-	407	-	-	-	383	-
Location Ave.	336	434	315	360	433	528	427	331	395 ^{2/}
LSD	.05	132	79	50	95	70	84	-	49
	.01	176	105	67	127	93	112	-	65

^{1/} Yield U.S. No. 1 potatoes

^{2/} State average

Meadows et al. table 2. Specific gravity of New York potato variety trials 1952

Variety	County							Variety
	Nassau	Suffolk	Erie	Niagara	Franklin	Genesee	Monroe	Ave.
<u>Early</u>								
I. Cobbler	1.064	1.063	1.080	1.073	1.077	1.078	1.075	1.073
Keswick	1.064	1.064	1.084	1.076	1.082	1.084	1.085	1.077
Cherokee	1.064	1.058	1.086	1.077	1.081	1.088	1.082	1.077
B 447-98	1.067	1.057	1.082	1.071	1.074	1.083	1.077	1.073
<u>Medseason</u>								
Kennebec	1.075	1.055	1.080	1.076	1.073	1.075	1.078	1.073
Placid	1.070	1.061	1.076	1.082	1.080	1.080	1.086	1.076
Katahdin	1.064	1.054	1.072	1.078	1.081	1.083	1.075	1.072
Pungo	1.075	1.059	1.080	1.080	1.081	1.083	1.084	1.077
B 73-10	1.066	1.057	1.082	1.073	1.081	1.079	1.079	1.074
F 4519	1.084	1.059	1.093	--	--	1.094	1.086	1.083
F 451	1.078	1.068	1.080	1.082	1.085	1.080	1.074	1.078
Canso	1.067	--	1.083	1.081	1.077	1.087	--	1.079
Pontiac	--	1.041	--	--	--	--	--	
New White	--	--	--	1.075	--	--	--	
<u>Late</u>								
B 606-67	1.069	1.050	1.086	1.082	1.087	1.082	1.074	1.076
Gr. Mountain	1.082	1.064	1.090	1.082	1.089	1.078	1.076	1.080
B 446-8	1.072	1.041	1.067	1.067	1.074	1.075	1.067	1.066
B 355-44	--	1.059	1.085	1.079	1.087	1.084	1.084	1.080
Canoga	--	--	--	1.080	--	--	1.073	
Location Ave.	1.071	1.057	1.082	1.077	1.080	1.082	1.078	1.075 ^{1/2}

^{1/} State average

NEW YORK

L. C. Peterson, M. K. Corbett, and A. P. Pieringer

The weather conditions during the 1952 season were not conducive to late blight. They were, however, very favorable for the development of scab and for the spread of leaf roll. Our plots on Long Island and in western and northern New York suffered from drought; whereas, in central New York, the plots received ample rainfall. This was the reverse of the situation experienced in 1951.

Approximately 250 crosses were made in the greenhouse this spring. While the major emphasis of this program is placed on resistance to late blight, many crosses included both scab-and blight-resistant parents while still others were made with the purpose of incorporating resistance to leaf roll, black spot, and the golden nematode.

Blight - Scab

The races of Phytophthora infestans and their relationships to the three major genes for blight resistance identified in Solanum demissum derivatives were described by Mills. (National Potato-Breeding Program, 1951). The object of the blight program is to combine into one horticulturally acceptable variety the three blight-resistant factors of S. demissum. All seedling families are first inoculated with a combination of the three single races B, C, and D of P. infestans. The immune seedlings are tubered and are subsequently inoculated with the combination races BC and BD of the pathogen. As is to be expected, the seedling mortality is high when they are subjected to this procedure. Several hundred seedlings considered as immune from all of the presently known races of P. infestans have been grown for at least 2 years under field conditions. Of these, a few have been saved for increase and trial in regional test plots in New York State.

Many of the seedlings handled under blight possess one or more scab-resistant parents. This is an attempt to combine resistance to both scab and blight in one plant. This past season was very favorable for the development of scab, especially in our scab nursery on Long Island. Some seedlings that appeared to be resistant in both central and western New York were classed as susceptible on Long Island.

Viruses

Intercrossing varieties and seedlings possessing some resistance to the leaf-roll virus was continued. Seedlings produced from such crossings were grown in rows alternating with plants infected with leaf roll. Viruliferous aphids were introduced into the plot, and the aphid population remained high. Results of the tuber-index trials indicate that a very small number of seedlings survive this exposure, and of these, only a few survived the second exposure without contracting leaf roll.

Seedlings produced as the result of inbreeding such varieties as Katahdin, Ashworth, Placid, etc., have been tested for their reaction to virus Y. Inoculations were made by rubbing. Seedlings exhibiting no reaction or necrotic reaction with local lesions were grown in an exposure plot similar to that described with leaf roll. Seedlings surviving the inoculations with virus Y and subsequently found to be free from the virus generally remained free from the virus under field conditions. In a number of cases this was not true. Fundamentally, a more intensive study of the hypersensitive reaction to virus Y is indicated.

Golden Nematode

A source of resistance to the golden nematode (Heterodera rostochiensis) was found by Dr. W. F. Mai in the species Solanum Ballsii and S. sucrense. Of these two species, S. Ballsii is the more resistant. It possesses 24 chromosomes and flowers poorly, and all attempts to cross this species with commercial potato varieties or to produce seed by selfing have resulted in failure. Solanum sucrense possesses 48 chromosomes and crosses readily with standard potato varieties. In this project, the crosses are made and seedlings produced in Ithaca. The testing of all materials is done by Dr. Mai at the Golden Nematode Laboratory, Hicksville, N. Y. It has been found that S. sucrense, while highly resistant to the golden nematode, varies in its reaction to the nematode. Seven inbred lines of this species, characterized by a very low infection reading, have been selected for further breeding work. The high degree of resistance of these seven lines to the golden nematode has been maintained over a period of 4 years. These resistant lines have been crossed with standard potato varieties.

NORTH CAROLINA

F. L. Haynes

The development of potato varieties with market appeal, quality, early to mid-season maturity, and resistance to southern bacterial wilt (brown rot), late blight, and scab are the principal objectives of this breeding program. Evaluations of progenies for disease resistance are conducted in cooperation with the Plant Pathology Department.

A recent expansion of the physical facilities available to this project will permit increased efficiency in the work. New analytical laboratories, cold-storage rooms, greenhouses, and field machinery are now available. Mechanical diggers are used at all locations. The acquisition of a portable, electrically driven grader permits mechanical grading of individual plots in the yield tests at all locations.

Yield test results from three of the four locations in the coastal area were very poor. Drought conditions accompanied by an extended period of excessively high temperatures during May and June caused heat damage to many tubers. This damage was followed by tuber rot. Losses were as great as 50 percent in many plots. The crop in this area is normally harvested in late June. The results for the fourth location, Aurora, are reported in N. C. table 1. This planting received irrigation.

N.C. table 1. Yield test at Aurora, N.C., 1952. Plots 1/125 acre, 4 replications in randomized block design.

Variety	Ave. yield per	Dry matter
	acre U.S. No. 1	content
	Bu.	Pct.
Bliss Triumph	359	Less than 15
White Cloud	352	16.0
Irish Cobbler	348	15.0
B 73-10	337	16.5
Essex	335	Less than 15
Cherokee	310	16.5
NC 2403-21	289	16.7
NC 2417-76	244	Less than 15
NC 880-7	225	" " "
NC 2391-77	212	15.0
NC 2415-11	100	16.0
L.S.D. .05	45	
.01	60	
C.V. for yield = 11%		

The yield tests for the mountain area were conducted at Hendersonville and Jefferson. Results are presented in N. C. tables 2 and 3. A heavy infection of late blight occurred at Jefferson late in the season. The harvest at this location was delayed for 10 days by rain, resulting in severe losses from late blight tuber rot. The extremely low yields of Sequoia and Bliss Triumph were caused by these losses. It will be noted that NC 880-4 yielded as high as Sequoia at Hendersonville where no late blight was present, and also yielded high at Jefferson. No tuber infection was found in NC 880-4, B 73-10, or in Kennebec. In all other lines at Jefferson, some infection was noted. The amount of infection was very slight in those breeding lines yielding higher than Kennebec (in N.C. table 3), and severe in Bliss Triumph, Sequoia and White Cloud in all replications.

All breeding lines are maintained and increased at two locations in the mountains at an elevation of 3,000 feet. Approximately 800 lines were grown at these two locations, and 225 were selected for further trial. Of 5,000 seedlings grown, 189 were selected for further trial.

N.C. table 2. Yield test at Hendersonville, N.C. 1952. Plots 1/250 acre, 4 replications in randomized block design.

Variety	Ave. yield per acre U.S. No. 1	Dry matter content
	Bu.	Pct.
Sequoia	343	18.4
Pontiac	342	16.0
NC 880-4	340	16.9
Essex	313	16.5
NC 2414-17	293	17.3
Kennebec	271	19.0
NC 733-4	269	20.0
Bliss Triumph	266	18.4
B 991-3	263	18.7
NC 2415-3	255	15.6
NC 2413-71	251	17.7
NC 913-2	238	16.5
NC 912-1	207	18.7
NC 793-14	195	18.4
White Cloud	127	19.0
L.S.D. .05	65	
.01	88	

C.V. for yield = 17%

N. C. table 3. Yield test at Jefferson, N. C., 1952.
Plots 1/250 acre, 4 replications in randomized
block design.

<u>Variety</u>	Ave. yield per acre
	<u>U.S. No. 1</u>
	Bu.
NC 2415-3	318
NC 880-4	301
NC 2170-3	283
NC 2117-4	236
NC 2413-71	224
B 73-10	221
NC 913-2	221
Kennebec	209
Colo. 6362	177
NC 912-1	158
I. 976-6	153
NC 2157-2	122
Bliss Triumph	113
White Cloud	89
Sequoia	84
L.S.D. .05	66
.01	89

C.V. = 24%

Three of the selections that have shown resistance to Pseudomonas solanacearum during the past three years were planted in a large experiment in 1952 to more critically compare the resistance of one with the other and with that of Green Mountain and Katahdin. The potatoes were planted March 27. Sufficient plots of Irish Cobbler, 638 (Prisca), 2777 and 2983 were planted to provide plants for three replications and three dates of harvest. Only 3 plots of each of Green Mountain and Katahdin were planted and these were harvested with the final harvest of the selections.

Katahdin and Green Mountain have been included in replicated experiments previously but were eliminated as susceptible on the basis on hills that become infected. In this test the varieties and selections were compared on the basis of diseased plants, diseased tubers and observations on the rapidity of symptom development. These data were obtained by studying both the plants and tubers of harvested potatoes. The harvest dates, relative proportions of infected hills and tubers are given in Nielsen table 1.

Selections 638 (Prisca) and 2983 had fewer infected hills and tubers than the other potatoes. On the basis of diseased hills Katahdin and Green Mountain were as susceptible as Irish Cobbler, but fewer Green Mountain tubers had symptoms of infection than Katahdin or Irish Cobbler. The selection 2777 was intermediate for vine and tuber symptoms.

The data on infected hills indicate no resistance in Katahdin and Green Mountain. These data were misleading as the infected plants of these varieties did not succumb to the disease as rapidly as Irish Cobbler. On July 3, 1952 a relatively few of these plants had died because of the disease.

The vascular symptoms of the tubers of Katahdin, Prisca and the numbered selections resembled those of Fusarium wilt. The discoloration was distinctly brown and largely restricted to the invaded xylem vessels. Isolations were made from a few affected vessels in tubers of 2777 and Katahdin. Bacteria having the culture characteristics of P. solanacearum were cultivated and it is believed the brown vascular discoloration in these potatoes was largely caused by the wilt pathogen. Tubers of Katahdin, 2983 and 2777 decayed more slowly than Irish Cobbler. On July 3 most of the infected Irish Cobbler tubers had decayed while most of the infected tubers of the others appeared to be normal except for the brown vascular discoloration.

Nielsen table 1. Percentage of hills and tubers infected by P. solanacearum on three dates of harvest.

Selection or variety	Percentage Infection					
	June 4		June 18		July 3	
	Hills	Tubers	Hills	Tubers	Hills	Tubers
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Irish Cobbler	15.0	6.5	53.0	27.2	72.2	36.5
2777 <u>1/</u>	.0	.0	5.0	1.3	48.1	24.3*
2983 <u>2/</u>	.0	.0	.0	.0	11.2	6.4*
638 (Prisca)	.0	.0	2.5	1.1	20.3	5.8*
Katahdin					76.2	48.3*
Green Mountain					70.6	12.9
L.S.D. 5%					13.5	10.4

1/ Parentage, President x Katahdin

2/ Parentage, Green Mountain x 336-144

* Includes tubers having a brown vascular discoloration similar in appearance to that of Fusarium wilt.

NORTH DAKOTA

W. P. Baird

Plains
Twenty-seven varieties of potatoes were tested at the Northern Great Field Station in 1952, each variety being replicated 5 times in randomized blocks. The results of this test are shown in North Dakota table 1. Despite dry weather at planting time, and in late summer and early fall, yields were better than average for dry land plantings in this area. The first killing frost occurred on the night of September 21.

North Dakota table 1. Potato variety trials at the Northern Great Plains Field Station, Mandan, North Dakota, 1952.

Variety	Average yield	No. 1 compared with total	Starch
	U.S. No. 1 per A		
	Bu.	Pct.	Pct.
White Rose	227.7	94	16.70
Norkota	207.0	91	16.17
Pontiac	204.3	93	12.67
Erie	201.9	93	17.59
Sequoia	189.0	91	14.94
Warba	187.9	85	16.69
Kennebec	184.4	93	16.70
Chippewa	178.5	88	14.96
Katahdin	168.8	92	15.43
Irish Cobbler	168.2	88	16.44
Triumph	166.9	89	13.29
Houma	165.6	83	15.66
Teton	163.7	88	14.40
Red Warba	160.9	85	16.05
Mohawk	160.4	93	17.73
Rural New Yorker	151.1	89	16.31
Russet Rural	148.1	88	17.23
U.S. 46952	148.0	90	13.66
Earlaine	147.8	86	13.91
Pawnee	142.3	82	15.17
Earlaine 2	139.9	90	11.19
Progress	129.5	71	15.18
Kasota	127.8	82	14.29
Sebago	125.2	86	14.94
Miraba	124.6	83	15.66
Cherokee	120.2	84	15.66
Green Mountain	72.6	77	13.15

L.S.D. 5% - 27 bushels

L.S.D. 1% - 36 "

Spacing rows $3\frac{1}{2}'$; hills 18". Plots $37\frac{1}{2}'$ long; 25 hills to plot.

NORTH DAKOTA
Wm. G. Hoyman

The 1952 scab nursery at Fargo included the stock entered in the national scab trials, as well as selections from Iowa and North Dakota. The red-skin selection, 45.11-101, developed by Ben Picha, of Grand Forks, was also included in the test. Due to a lack of rain during May and June, it was not possible to prepare the soil in the regular scab nursery, and the planting was made at another location. Sufficient scab was not present at this location to give satisfactory results. The alternating Triumph check rows had very little scab. Many selections had a skin cracking that had never been observed in such abundance in the Fargo clay soil. The cracks varied in depth and width and were scored in North Dakota table 1 as 1c, 2c, 3c, and 4c. For example, a reading of 1-3c for B 73-10 indicated the selection had cracks severe enough to be rated type 3, and the tuber area covered was less than 20 percent.

N. Dak. table 1. Scab readings of selections and varieties included in the national scab trial.

Pedigree	Scab	Pedigree	Scab
B 73-10	1-3c	B 2935-7	1-3c
B 595-76	2-3c	B 2968-56	1-2
B 904-6	3-3c	B 2968-66	1-2
B 2069-74	1-3c	B 3003-27	1-3c
B 2131-3	tr 2	B 3003-36	2-2c
B 2162-18	1-3c	B 3004-9	tr 2
B 2162-36	1-2	B 3008-10	1-1
B 2162-49	tr 2	B 3009-9	1-3c
B 2173-22	5-3c	B 3014-15	2-3c
B 2331-1	1-3c	B 3015-23	1-1
B 2337-7	1-3c	Neb 59. 41p1	3-3c
B 2340-2	2-2	B 2336N1	1-3
B 2368-6	tr 2	MD457	1-3
F 2368-13	1-4c	Cayuga	3-4c
B 2369-4	2-3c	Progress	1-4
B 2861-1	2-3c	Menominee	1-3c
B 2874-3	1-2	Cherokee	1-2c
B 2874-4	1-4	Triumph	1-3
B 2875-6	3-4c	M330	1-3c
B 2875-7	1-2	M439	1-3c
B 2879-4	1-3	M304	4-4c
B 2879-5	2-2c	303.41-4	1-1c
B 2879-7	2-3c	Sebago	1-4c
B 2888-2	2-3c	X26-8	1-3c
B 2892-3	1-3	I803-1	1-3
B 2893-11	1-1	I811-1	1-3c
B 2900-24	2-3c	I872-2	1-2
B 2900-42	1-3c	I915-1	1-3c

N. Dak. table 1 continued.

Pedigree	Scab	Pedigree	Scab
B 2900-54	1-3c	I957-1	3-3
B 2920-13	1-2c	I961-1	1-3
B 2921-4	1-2	B 284711	1-1
B 2921-10	tr 2c	I 8167-2	1-2c
B 2922-15	1-1	I8168-31	1-2
B 2922-26	1-2	45.11-101	1-2c
B 2922-29	1-3c		

A more satisfactory scab test was obtained at Northwood where the U.S.D.A. seedling and increase plots are maintained. North Dakota table 2 includes some of the virus-free stock being increased for certified seed growers.

N. Dak. table 2. Scab readings on varieties increased at Northwood.

Variety	Amount of scab	Type of scab
Red Pontiac	2	4
Cherokee	trace	3
Kennebec	1	4
B 515-2	0	0

The 1952 scab readings at Northwood are comparable to those obtained in previous years and indicate that B 515-2 has the highest degree of scab resistance of any variety or selection tested in the Northwood soil. Although Cherokee had type 3 scab, there was a very slight amount. Kennebec is designated as having type 4, but the tubers of this variety generally have a large percentage of their surface covered with type 2.

Virus Y

In previous reports it has been shown that Kennebec possesses field resistance to virus Y. Limited greenhouse tests with three strains of the virus have confirmed the field observations. Among the strains mechanically inoculated to Kennebec was the severe strain Y530; it produced no symptoms on this variety.

Of the many selections tested in the virus-Y plot, ND457 continues to show the highest degree of resistance. It has been grown adjacent to Y-infected potatoes for several years and still no field symptoms have been observed. When large numbers of Y-carrying green peach aphids (*Myzus persicae*) are placed on ND457 there is evidence to indicate infection may take place. Mechanical inoculations were made with three strains of virus Y, and the severe strain Y530 caused typical symptoms in the greenhouse.

B 515-2 was first grown in the Red River Valley in 1948. Further tests in North Dakota and in some other potato-growing areas indicated it might have sufficient desirable qualities to be named. With this in mind it has been increased under contract by a few certified growers in North Dakota. Approximately 10,000 bushels were harvested in 1952.

Of all the russet-skin potatoes tested in North Dakota, including Russet Burbank, B 515-2 appears to be the best adapted. Its degree of russeting is similar to Russet Burbank but the location where it is grown has considerable effect on the appearance of the skin. In Maine, for example, the russeting is very light. An outstanding characteristic of B 515-2 is its high degree of scabresistance. The fact that it is early in maturity has been one factor in its favor at certain locations in Idaho, as well as at other places. Throughout the Red River Valley the tuber shape has been better in the lighter soils.

Excessive moisture in August of 1951 caused severe growth cracking in B 515-2. In a normal growing season the percentage of cracking is low. Under irrigation the growth could be controlled more effectively and the yield increased. B 515-2 does not set a large number of tubers, and a closer spacing would be desirable when given supplemental moisture. Although excessive moisture during the latter part of the growing season may cause growth cracking in B 515-2, this selection does not appear to be subject to unusual amounts of hollow heart. Experiments in Wisconsin have shown it has a very slight amount of physiological internal necrosis. Additional information is available regarding the reaction of B 515-2 to the common potato diseases; these will be reported when it is named.

The specific gravity of B 515-2 tubers grown in North Dakota has always been low. In 1952, readings of 1.067 and 1.077 were obtained on tubers grown at Grand Forks and Northwood, respectively. To determine if the low dry-matter content affected the table quality, tubers have been consumed by many people; the reports to date have not been discouraging. It is quite possible that a potato low in starch would be preferred by the public, provided it were accepted for the table. Through the medium of advertising the public is frequently reminded of starchy foods in the diet and a potato low in starch might appeal to them.

Adaptation Test

The federal seedling tubers supplied each year by Dr. F. J. Stevenson are planted at Northwood, N. Dak. The Northwood soil is infested with strains of the common scab organism, which cause a high percentage of the stock to scab each year. Only 11 seedling hills were saved from the 5,284 tubers planted in May. In addition to scab resistance other factors were considered when making the selections.

Twenty-five advanced selections were saved to increase in 1953. Most of these have not been grown in North Dakota long enough to determine their adaptability. B 2368-4, a red selection yielding well in Maine, does not have smooth tubers when grown in the Red River Valley. It is also not scab resistant in the Northwood soil.

During the harvest at Chapman Farm, tubers were obtained from the seedling hills of 15 families. Forty-six advanced selections were also obtained to test in the Red River Valley.

Iowa Increase Plot

Advanced stock from Dr. C. E. Peterson's Federal potato-breeding program at the Iowa State College was increased at Northwood at an isolated location. The plot was located where the soil was known to be infested with the common scab organism. This provided Dr. Peterson an opportunity to obtain scab readings in soil having strains that differ in pathogenicity from the strains present in the peat soil at Clear Lake, Iowa.

Foundation Seed

Virus-free tubers of the varieties Red Warba, Red Pontiac, Kennebec, Cherokee, and B 515-2 are being maintained as a source of foundation seed for certified growers. Indexing is done in the greenhouse each winter. In addition to observing the plants for visible virus symptoms, they are tested for virus X by using the indicator Gomphrena globosa.

Yield Increase From Zinc

Previous research in the Red River Valley has shown that the dusting and spraying of zinc-containing fungicides on potato foliage increased the yield regardless of whether early blight was present or absent. A zinc sulfate spray has also given a response. In 1952, four applications of zinc sulfate at the rate of 2 pounds per 100 gallons of water gave a highly significant increase on Cobblers. The spray was applied with a high-pressure sprayer at the rate of 90 gallons per acre. Two hundred fifty pounds of 3-12-12 fertilizer was applied per acre at planting. An increase of 65 bushels per acre was obtained from the zinc-sprayed potatoes; the required difference at the 1-percent level was 37.2 bushels.

Seed Treatment

The acid-mercury dip treatment of cut seed potatoes is used by many growers in North Dakota. Inspection records of the North Dakota State Seed Department indicate this treatment reduces the amount of blackleg and ring rot. Although this treatment is very toxic to the blackleg and ring-rot bacteria, an effective dust treatment of cut seed would be more convenient to apply. Cut seed of the variety Red Pontiac was treated with seven fungicidal dusts and the acid-mercury dip treatment. The dusts included 5% Zerlate, 1% Spergon, 5% Arasan, 5% Manzate, 5% Phygon, 5% Parzate (Dithane), and Long's Mercureoform; each was applied at the rate of 1 pound per 100 pounds of cut seed. The check treatments consisted of untreated cut seed and

cut seed dusted with pyrax. Pyrax was the diluent used in mixing the fungicidal dusts. The treatments did not improve the emergence of the plants nor did they increase the yield. Although the plot was planted early to encounter adverse growing conditions, no blackleg was present.

Vine Killing

It has been established that the killing of potato vines early, as well as rapidly, causes more internal tuber discoloration than if the vines were killed slowly and later in the season. There is some indication that the pulling of vines reduces the amount of discoloration. In 1952 a vine-pulling machine appeared in North Dakota. If vine pulling does cause less discoloration and a satisfactory machine can be made, this method of vine elimination would have its advantages. A comparison was made of the amount of discoloration in Red Pontiac tubers harvested from plots where the vines were pulled and cut at the soil level. The pulling and cutting were done by hand in order to be certain an efficient job was done. There was 6.8 percent discoloration in the tubers harvested from the pulled vines in comparison with 21.4 percent in the tubers from the cut vines. An analysis of the data indicated the difference was significant.

NORTH DAKOTA

J. H. Schultz and Robert Johansen

The problem, objectives, and plan of work in potato breeding for North Dakota remain essentially the same as those reported in our 1951 report.

New Varieties

Two newly named varieties, Manota and Redkote, are of interest to North Dakota and are discussed later in this report. Both are a step in the right direction and have merit where adapted.

State-wide Potato Variety Trials

Six replicated uniform potato variety trials were grown in North Dakota during 1952. These were located at the North Dakota Agricultural Experiment Station at Fargo, Langdon, Minot, and Williston, with and without irrigation, and at the Red River Valley Potato Growers' Association research farm at Grand Forks.

Trials were planted as randomized blocks with 4 replications of 25 hills each per variety. No fertilizer was applied except at Grand Forks and Langdon where 300 pounds per acre of 0-30-15 was applied in a band at planting time.

Planting and harvest dates varied from May 2 to 9 and September 9 to 29, respectively, at various locations. April, May, June, and September were abnormally dry, while precipitation in July and August was generally adequate except at Fargo and Grand Forks where it was excessive in July.

The total yields in bushels per acre and average percentage U.S. No. 1's and specific gravity of potatoes grown in these trials are reported in Schultz tables 1 and 2, respectively.

Schultz table 1. Total yield in bushels per acre and average percentage U.S. No. 1 potatoes grown in State-wide variety trials, 1952.

Variety	Yield per acre and location						Ave. 6 locations	
	Fargo	Grand Forks	Langdon	Minot	Williston			
					Dryland	Irrigation	Yield	U.S. 1
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Pct.
Red Pontiac	470	268	228	354	377	426	354	97
Kennebec	400	286	196	315	361	429	331	96
Redkote	369	249	186	291	330	386	302	94
Cobbler	404	280	179	277	277	342	293	94
Triumph	329	243	188	256	285	392	282	94
ND 457-1	372	270	170	301	248	307	278	96
B 515-2	409	217	148	231	253	380	273	86
Manota	334	205	174	240	280	353	264	95
C.S. 6316	263	212	149	199	263	269	226	96
Average	343	254	182	263	297	365	284	94
L.S.D. 5%	84	30	31	37	46	91	25	
L.S.D. 1%	114	40	42	50	63	124	32	

Schultz table 2. Specific gravity of potatoes grown in State-wide trials in 1952 ^{1/}

Variety	Specific gravity and location						Average 6 locations
	Fargo	Grand Forks	Langdon	Minot	Williston		
					Dryland	Irrigation	
Red Pontiac	1.075	1.073	1.083	1.079	1.069	1.081	1.077
Kennebec	1.083	1.085	1.089	1.084	1.078	1.086	1.084
Redkote	1.081	1.084	1.093	1.085	1.071	1.082	1.083
Cobbler	1.087	1.084	1.092	1.085	1.090	1.088	1.088
Triumph	1.078	1.074	1.086	1.078	1.080	1.084	1.080
ND 457-1	1.087	1.090	1.093	1.093	1.087	1.090	1.090
B 515-2	1.074	1.074	1.076	1.075	1.077	1.086	1.077
Manota	1.085	1.086	1.089	1.081	1.089	1.090	1.087
C.S. 6316	1.083	1.086	1.093	1.091	1.082	1.091	1.087
Average	1.081	1.082	1.088	1.083	1.080	1.086	1.084
L.S.D. 5%	.0054	.0056	.0040	.0057	.0048	.0031	.0032
L.S.D. 1%	.0074	.0077	.0055	.0078	.0067	.0043	.0043

^{1/} Specific gravity was determined by the use of the National Potato Chip Institute potato hydrometer, using an 8 pound sample from each of two replications.

There was very little variation in percentage U.S. No. 1 tubers for the various varieties and locations except that B 515-2 dropped to 57 and 83 percent U.S. No. 1 at Fargo and Minot, respectively, due to growth cracks.

Cobbler. Conditions were favorable for this variety in 1952. It is in strong demand by chip manufacturers.

Kennebec. Conditions were very favorable for maturity of late varieties and as a result Kennebec had higher specific gravity than normal for North Dakota.

Manota. This variety, formerly ND 134-19, was named early in 1952 by the University of Manitoba in cooperation with the North Dakota Agricultural Experiment Station. It is comparable to Cobbler in maturity, yield, table quality, and disease reaction. The tubers have white skin and shallow eyes, are oval-oblong, and have uniformly good tuber type in heavy soils. The flesh is very white and remains so when exposed to air either before or after cooking. While comparable to Cobbler in mealiness and table quality, it appears to be much less subject to sloughing and hollow heart. It may be a substitute for Cobbler where scab and late blight are not serious problems.

Redkote. This variety, formerly known as Picha 45.11-101, was named in late 1952 by Mr. Ben Picha, a private potato breeder of Grand Forks, N. Dak., who bred and developed it. The variety seems to be intermediate between Triumph and Red Pontiac in yield, skin color, and tuber type but superior in table quality and scab resistance. It is comparable to Pontiac in maturity. While not a major improvement over Triumph and Pontiac or Red Pontiac, it seems to be superior in some respects.

The North Dakota Agricultural Experiment Station has cooperated in testing this variety on the basis of its merits but is in no way responsible for its development.

Red Pontiac. Aside from having the highest average yield for the six locations, this variety also had fairly high specific gravity in 1952, many tubers from the Langdon trial having readings in the '90's.

Triumph. Growing conditions were generally favorable for Triumph and it responded well in our trials.

B 515-2. This selection has been increased extensively in North Dakota. It is comparable to Triumph in maturity and yield, and under the conditions of our trials it averages about the same as Pontiac or Red Pontiac in specific gravity. Under favorable growing conditions it is a very smooth, long-oval, shallow-eyed russet and in some cases even has fairly high specific gravity. It has excellent scab resistance as reported elsewhere by Dr. Hoyman. Under conditions conducive to second growth, it is very subject to growth cracks which accounts for the low percentage of U.S. No. 1 tubers in the Fargo trial.

C.S. 6316. Low yielding ability is the major short-coming of this selection. Tubers from the 1951 trials retained a conspicuously high ascorbic acid content in storage. Tubers from the 1952 trials will be analyzed at a later date.

ND 457-1. This potato is currently our most advanced numbered selection. It has been tested more thoroughly and extensively in North Dakota than any other unnamed selection now under trial. It has promise of being a replacement for Cobbler. Its outstanding features are its excellent tuber type under all soil conditions, clear waxy-white skin, field resistance to virus Y, moderate scab tolerance, and Cobbler yield and quality.

Although ND 457-1 has excellent resistance to virus Y, it is neither immune nor a carrier, as demonstrated by the writer through inoculation by reciprocal grafts with appropriate infected varieties in April 1951 and 1952. When thus infected, it shows good symptoms of virus Y.

North Central Regional Uniform Potato Variety Trial

In cooperation with potato breeders from the North Central States of Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, and Wisconsin, a uniform potato variety trial was grown at Grand Forks, N. Dak. The results from this trial are being reported cooperatively by the North Central States.

Potato Crossing Program

Three hundred sixty crosses and four self-pollinations were made in the greenhouse in the early spring of 1952. An excellent seed set totaling 2,268 seed balls was obtained which supplied much more hybrid seed from controlled crosses than could be grown as seedlings in the greenhouse space available during the summer and fall months. Most of the varieties and selections used as parents had a high degree of resistance to one or more diseases, particularly scab, late blight, virus X, and virus Y. The principal horticultural characters

sought were quality, tuber type, high yield, early maturity, both red and white skin color, freedom from growth defects, and resistance to bruising. All are available in various varieties and selections used in the breeding program.

Greenhouse and Field Seedlings

Approximately 27,000 seedlings from controlled crosses were grown in the greenhouse in 1952. These were transplanted to benches during August and harvested in November and December.

Late blight inoculations of seedling families bred for blight resistance were again made as in 1951 in cooperation with Dr. W. G. Hoyman of the Department of Plant Pathology.

Inoculations of seedling families bred for immunity to virus X were again made with a virulent strain of ringspot virus X. Individual seedlings were mechanically inoculated and about 60 percent of the seedlings in these crosses appeared to be immune but some may be escapes.

A considerable number of seedling tubers having resistance to virus Y in their parentage were supplied to the Department of Plant Pathology for field tests for resistance to this disease and scab. Most of these included ND 457-1 in their parentage.

First-year seedling tubers and at least a nucleus of each advanced North Dakota selection were grown under isolation from virus diseases at Langdon. Advanced selections were grown for adaptation and disease resistance in appropriate trials at Grand Forks and Fargo.

OHIO

John Bushnell

Stock of B 638-16 is being increased with a view to introduction because of its excellent flavor as grown in Ohio. Its productivity and time of maturity, judged from small plots of tuber units, are about the same as Katahdin. Its handicap is a distinct light yellow color of the flesh. Part of the stock was increased this year by Wm. G. Hoyman of North Dakota. As the distinctive merit of this seedling is its table quality, samples will be furnished gladly to any cooperator who may care to include it in cooking tests. At the direction of F. J. Stevenson, its number henceforth will carry the prefix "O" thus becoming OB 638-16.

Project title: Purnell 76. Evaluating insect resistance in varieties and strains of potato.

Project leader: J. P. Sleesman

Importance of the problem: The potato leafhopper, if not controlled by the application of an effective insecticide, causes a reduction of 25 to 50 percent annually in the yield of potatoes in Ohio. The potato flea beetle, the pink and green potato aphid, and the green peach aphid also are important pests of potatoes.

Objectives: To develop a variety of potato that combines resistance to insects with desirable horticultural qualities and which will produce a satisfactory crop without having to be sprayed at all or with fewer applications of a spray material than is required by present-day commercial varieties. Insect resistance should be combined with resistance to early and late blights if the grower is to receive maximum benefit from the breeding program.

Plan of work: Data will be obtained on insect populations, insect injury, yield and tuber quality for selected seedlings and varieties. Unselected progenies will be scored for leaf hopper injury (hopperburn). Leafhopper populations, degree of flea beetle injury, and aphid population will be obtained on various species of Solanum.

Location: Wooster, Ohio.

Results: Approximately 1,300 first year seedlings received from Dr. Stevenson were grown at Wooster. Data on hopperburn injury to these progenies are presented in Ohio table 1. Of these seedlings 5 percent were saved for planting in 1953.

Seventy selected seedlings and/or varieties were planted in 25-foot plots at Wooster. Data on leafhopper populations, hopperburn, potato flea beetle injury, and maturity are given in Ohio table 2. As in previous years, the seedlings that were most resistant to the potato leafhopper were late in maturing and produced tubers with knobs, deep eyes, growth cracks, and a flaky skin. Fifteen of these seedlings were saved for planting in 1953.

Ohio table 1. Reaction of progenies of different crosses to leafhopper injury (hopperburn) at Wooster, Ohio. 1952

Pedigree No.	Parentage	Seedlings tested	Seedlings placed in several classes of hopperburn 1/				
			1	2	3	4	5
		No	Pct.	Pct.	Pct.	Pct.	Pct.
B 3317	B 721-1 x Menominee	413	2	7	17	38	36
B 3357	B 724-1 x Teton	542	14	25	26	28	8
B 3363	B 478-1 x B 721-1	339	1	9	19	32	39

1/ Classes of hopperburn :

1 = 0 to 10%	4 = 50% to 75%
2 = 10% to 25%	5 = 75% to 100%
3 = 25% to 50%	

Ohio table 2. Leafhopper populations, degree of hopperburn, and the amount of adult flea beetle feeding for the seedlings and varieties shown. Wooster, Ohio. 1952

Pedigree No.	Parentage	Leafhopper nymphs per leaf	Hopper-burn	Maturity	Flea beetle holes per leaflet
		No.	Class 1/	Class 2/	No.
OB 2904-1	B301-29 x B 61-3	4.8	4	E	25.6
" " -2	" "	5.0	4	E	23.3
" " -3	" "	4.8	2	L	16.6
" " -4	" "	6.6	2	L	13.3
" 2905-1	B 301-29 x B 355-35	2.8	2	L	15.3
" " -2	" "	1.4	1	L	18.5
" " -3	" "	3.0	4	ML	15.9
" " -4	" "	7.8	4	L	20.7
" 2922-1	B 607-72 x B 598-29	2.4	3	ML	13.5
" 3016-1	B 478-1 x B 582-33	3.4	4	E	33.4
" 3016-2	B 478-1 x B 582-33	4.4	4	L	35.8
" 3017-1	Sequoia x 247-24	6.4	2	L	28.5
" 3018-1	Sequoia x B 962-32	2.8	1	L	19.7
" " -2	" "	5.8	2	L	26.7
" " -3	" "	1.0	1	L	18.5
" " -4	" "	1.6	1	L	10.1
" " -5	" "	3.2	4	L	12.7
" " -6	" "	4.8	1	L	19.7
" " -7	" "	3.8	3	L	30.6
" 3019-1	Sequoia x B 986-7	1.8	3	L	21.5
" 3020-1	B 721-29 x B 724-1	7.1	3	L	18.0
B 3020-12	" "	3.2	5	L	19.0
" 3021-1	B 721-30 x B 724-1	6.1	5	E	23.7
OB 3022-1	B 724-1 x Ruska	1.4	2	L	17.2
" " -2	" "	3.8	5	E	10.1
" " -3	" "	5.2	4	ML	13.8
B 3021-39	B 721-30 x B 724-1	10.4	5	ML	20.0

Ohio table 2 continued

Pedigree No.	Parentage	Leafhopper nymphs per leaf	Hopper- burn	Matur- ity	Flea beetle holes per leaflet
		No.	Class 1/	Class 2/	No.
OB 3023-1	B 724-20 x B 778-43	1.8	1	L	8.0
" " -2	" "	2.4	1	L	17.5
" 3024-1	B 724-20 x B 872-70	3.6	2	L	13.9
" 3027-1	B 926-6 x B 724-1	4.0	2	L	18.0
" " -2	" "	4.2	2	L	9.2
" " -3	" "	5.6	3	L	28.1
" " -4	" "	6.8	4	ML	31.8
" " -5	" "	6.2	3	L	15.4
" 3029-1	B 724-15 x B 872-70	6.2	5	E	9.3
" " -2	" "	1.4	2	L	20.3
" " -3	" "	4.2	5	E	4.8
" " -4	" "	2.4	3	L	12.9
" " -5	" "	3.0	2	L	14.1
" " -6	" "	3.8	2	L	20.4
" " -7	" "	3.8	4	ML	15.9
" " -8	" "	1.0	2	L	17.9
" 3030-1	B 478-1 x B 929-6	1.8	1	L	10.5
" " -2	" "	1.0	1	L	13.2
" " -3	" "	3.4	4	L	27.5
" " -4	" "	1.8	2	L	21.2
" " -5	" "	2.4	4	L	13.7
" " -6	" "	3.6	3	ML	8.4
" " -7	" "	2.6	3	L	24.5
" " -8	" "	4.8	3	L	24.1
" " -9	" "	1.8	1	L	19.6
" " -10	" "	6.4	4	L	19.8
" " -11	" "	4.6	3	L	23.1
" " -12	" "	6.2	5	ML	18.2
" 3031-1	B 724-1 x B 778-43	1.8	1	L	19.8
" 3037-1	Empire x B 355-35	2.8	1	L	12.7
" 3038-1	Empire x B 355-44	3.0	4	E	22.8
" " -2	" "	3.0	2	L	11.5
" " -3	" "	3.8	1	L	12.4
" 3039-1	Empire x B 434-91	2.0	4	E	7.8
" " -2	" "	3.2	1	L	19.8
" 2586-1	" "	3.4	4	ML	9.7
" " -2	" "	8.4	2	L	17.1
" " -3	" "	1.9	4	L	24.4
" " -4	" "	2.6	5	E	4.8
" " -5	" "	5.8	3	ML	18.0
" 478-1	Sequoia x B 96-56	2.2	2	L	17.5
Kennebec		8.4	5	ML	27.0
Katahdin		4.2	4	ML	19.1

1/ See footnote in Ohio table 1. 2/ E, early; ML, medium late; L, late.

PENNSYLVANIA
J. S. Cobb 1/

The usual variations in yield and quality seemed to be associated with rainfall and temperature. All the regions except Potter and Somerset Counties had good rainfall and high temperatures. Potter and Somerset had fair rainfall and not so much heat.

The State College data were omitted since they were not reliable due to a prolonged dry spell and very poor stands.

The data for tests in Chester, Lehigh, Potter, Schuylkill, and Somerset Counties are given in Cobb table 1.

1/ This information was prepared by Agronomy Extension, Agricultural Economics Extension, Entomology Extension and Plant Pathology Extension in cooperation with the Experiment Station Staffs of Agronomy and Botany.

Cobb table 1. Uniform potato variety demonstrations 1952. Yield of 16 varieties in bushels per acre.

Variety	Location, yield per acre, and starch content															
	: Chester Co. : Lehigh Co. : Potter Co. : Schuylkill Co. : Somerset Co. : Ave. 5 Demons.				: Total US 1 Starch: Total US 1 Starch: Total US 1 Starch: Total US 1 Starch: Total US 1 Starch: Total US 1 Starch				: Bu. : Bu. : Bu. : Bu. : Bu. : Bu.				: % : % : % : % : % : %			
Very late	Bu.	Bu.	Bu.	Bu.	%	Bu.	Bu.	Bu.	Bu.	%	Bu.	Bu.	Bu.	Bu.	%	Bu.
Russet Rural	273	109	9.8	656	177	--	462	250	12.7	403	165	11.5	611	391	14.1	481
White Rural	284	134	9.9	626	328	11.7	430	254	13.4	410	242	10.5	600	444	14.4	470
2X-J-1 ² / ₂	226	129	9.9	491	386	11.9	513	401	11.0	403	282	10.7	542	380	11.2	435
Medium late	Bu.	Bu.	Bu.	Bu.	%	Bu.	Bu.	Bu.	Bu.	%	Bu.	Bu.	Bu.	Bu.	%	Bu.
Pontiac (red)	414	224	-	710	401	9.9	539	442	11.7	537	306	--	550	462	11.9	550
Katahdin	365	328	9.8	640	528	13.7	452	380	13.4	583	402	10.2	502	447	14.1	509
Kennebec ² / ₂	350	199	9.8	670	298	11.9	505	359	13.2	435	252	11.9	558	519	14.7	504
Conga	343	271	9.9	629	547	12.7	444	324	13.2	551	331	11.9	518	446	12.7	497
Canus	398	375	9.8	691	632	10.0	439	316	11.5	417	337	9.9	514	503	11.5	492
Keswick ² / ₂	324	282	10.7	514	280	14.2	376	233	13.7	411	354	11.9	426	400	14.2	410
Cherokee ² / ₂	285	239	9.8	475	179	12.2	427	341	14.4	277	150	10.2	418	359	14.9	376
Canso ² / ₂	225	211	9.9	480	427	12.1	383	348	14.9	294	235	10.7	376	323	15.4	352
Early	Bu.	Bu.	Bu.	Bu.	%	Bu.	Bu.	Bu.	Bu.	%	Bu.	Bu.	Bu.	Bu.	%	Bu.
Chippewa	329	286	9.8	653	522	10.2	463	383	11.9	495	406	10.0	448	412	12.4	478
I. Cobbler	380	312	10.0	603	106	10.7	337	256	14.4	376	225	10.2	397	349	14.2	419
Waseca (red)	384	357	9.8	491	270	9.9	323	271	12.9	360	245	9.8	314	263	10.7	374
3R-3 ² / ₂	291	236	10.0	429	264	11.7	367	264	13.2	355	238	11.0	352	331	12.4	359
Red Warba (red)	317	174	10.0	482	36	10.0	262	123	13.7	257	74	9.9	226	153	13.2	309

2/ Resistant to the common race of blight, but susceptible to a new race that is becoming widespread.
Should be sprayed the same as a blight susceptible variety.

3/ Scab resistant

PENNSYLVANIA
(Bureau of Plant Industry, Pa. Department of Agriculture)
R. E. Hartman

Wart-Immunity Tests
U.S. Department of Agriculture Seedlings and Named Varieties

This year's wart-immunity test of 24 seedlings and named varieties was made in heavily infested soil at Bernice, Sullivan County, Pa. The area has an altitude of 2,000 feet and a cool, moist climate.

The season was extremely dry and not favorable for wart development. The drought caused severe early yellowing with 50% of leaf surface yellowed by August 1, and all vines were dead September 1, 1952.

These seedlings and varieties tested are given in Hartman table 1, and harvest data are given in Hartman table 2. Of the 24 seedlings and named varieties tested 9 showed wart infection, and 15 were immune, or at least showed no infection this season. Of the 24 checks (10-row hills of susceptible Russet) 24 were infected.

The following seedlings should be rechecked in 1953 and any other additional new seedlings considered promising. Probably this phase of the wart studies will be discontinued in a few years.

Recheck list:

Canso	B515-2	B911-10	B2067-1
B73-10	B606-37	B922-6	B2067-18
B73-18	B606-67	B991-3	B2368-11
B447-98	B721-1	B991-14	

Hartman table 1. Seedlings and varieties in the wart-immunity tests,
Bernice, Pa., 1952.

Row No.	Variety or seedling	Parentage
1	X927-3	APP-9 x Katahdin
2	Canso	Can. Seedling
3	Keswick	" "
4	B 73-2	Mohawk x (X96-56)
5	B 73-3	" "
6	B 73-10	" "
7	B 73-18	" "
8	B 355-44	(X96-56) x Saranac
9	B 447-98	(X96-345) x "
10	B 515-2	Rus. Burbank x (X96-56)
11	B 606-37	41956 x (96-56)
12	B 606-67	" "
13	B 721-1	Earlaine x Teton
14	B 911-10	O55 x Teton
15	B 922-6	TL 5 x B 355-24
16	B 936-12	(X792-94) x B 294-38
17	B 962-3	B 81-40 x (245-186)
18	B 991-3	B 355-24 x B 81-40
19	B 991-14	" "
20	B 2067-1	Chippewa x B 381-2
21	B 2067-18	" "
22	B 2368-4	Pontiac x B 400-1
23	B 2368-6	" "
24	B 2368-11	" "
25	Duplicate B 2067-1	Chippewa x B 381-2

Hartman table 2. Harvest record of seedlings and named varieties in wart-immune tests, Bernice, Pa., Sept. 11, 1952.

Seedling or variety tested										Check		
Row	Variety or	Hills	Vine	Maturity	Hills	Hills	Yield	Yield	Vine			
No.	seedling No.	Hills: warted	Hills: growth	: Yld	: Maturity	: Hills	: warted	: Yld	: growth	: Maturity		
		No.	No.			No.	No.					
1	X927-3	10	10	Fair	V. good	Late	10	Medium	Good	Late		
2*	Canso	8	None	"	Fair	Early	9	Good	"	"		
3	Keswick	10	1	Good	"	Med. late	10	"	"	"		
4	B 73-2	10	2	"	Good	Late	9	Medium	"	"		
5	B 73-3	9	3	Poor	Fair	Early	10	"	"	"		
6*	B 73-10	9	None	Fair	Poor	Med. early	7	"	"	"		
7*	B 73-18	9	"	Poor	Fair	Early	10	"	"	"		
8	B 355-44	9	3	Medium	"	Late	10	Good	"	"		
9*	B 447-98	10	None	Poor	Good	"	10	Poor	Fair	"		
10*	B 515-2	10	"	"	Fair	Med. early	10	Medium	Good	"		
11*	B 606-37	10	"	Medium	Good	Late	10	Fair	Good	"		
12*	B 606-67	10	"	Fair	"	"	10	"	"	"		
13*	B 721-1	10	"	Poor	Fair	Med. late	10	"	"	"		
14*	B 911-10	10	"	Fair	"	"	10	"	"	"		
15*	B 922-6	9	"	Poor	Poor	Early	10	"	"	"		
16	B 936-12	10	2	"	Fair	"	9	Good	"	"		
17	B 962-3	10	2	Fair	Medium	Med. late	10	"	"	"		
18*	B 991-3	10	None	Poor	Poor	"	8	Fair	Fair	"		
19*	B 991-14	10	"	V. poor	V. poor	Early	10	"	"	"		
20*	B 2067-1	10	"	Poor	Poor	Med. late	10	Medium	"	"		
21*	B 2067-18	10	"	"	"	Early	9	Fair	Medium	"		
22	B 2368-4	9	1	Good	Good	Early	10	Fair	Good	"		
23	B 2368-6	10	None	Fair	Fair	Late	10	Medium	Good	"		
24*	B 2368-11	9	1	"	Good	Med. early	10	"	"	"		
25	Second lot					Late	8	"	"	"		
	B 2067-1	9	None	Poor	Poor	Med. late	10	"	"	"		

* Retest 1953

PENNSYLVANIA
W. R. Mills

There was no blight in State College in 1952. There was no significant rainfall from the last of May until the last of August. At that time the early varieties were dead and the late ones too far gone to benefit from the meager rains that followed. As a result of the drought and record heat, yields of all plots were very low. Intelligent selection was almost an impossibility.

In the report for last year the writer, in cooperation with L. C. Peterson (Cornell), summarized their views concerning the relationship between genes for resistance to late blight, inherited from Solanum demissum, and races of Phytophthora infestans. We have found races capable of infecting plants possessing the single genes B, C, or D, as well as races virulent for the genetic combinations BC and BD. No race was known in the United States which would attack plants carrying both genes C and D.

Wherever Solanum demissum has been used as a source of resistance to blight, the appearance of new races of Phytophthora has practically kept abreast of the development of new, resistant genotypes. We were, therefore, much interested in trying to determine if resistance of the "CD" genotype might be more permanent than that produced by the single genes or the combinations of B and C, and B and D. Our experience had pointed to that possibility.

It was considered that Mexico offered the ideal conditions required for further testing of immune selections. This was based on the following facts:

1. Most, if not all, of the species that have shown high resistance or immunity have come from central Mexico.
2. P. infestans is perennially present in the same area.
3. Some collections of S. demissum are known which carry less than the full complement of genes for resistance, and are susceptible to one or more of the recognized races. In their natural habitat, such a heterogeneous population of S. demissum plants has undoubtedly been in close association with P. infestans for a very long time. It appears probable that the races capable of developing on S. demissum are already present in Mexico. Any variety, immune in Mexico, might be expected to maintain that immunity for a long time.

Blight in Mexico

Through their interest and cooperation, the writer was able to spend the 4 months of July through October, 1952 with the Rockefeller Foundation in Mexico. Work was done in collaboration with Dr. John Niederhauser, leader of the potato improvement project there. The following remarks summarized two papers presented by us for publication in Phytopathology.

A collection of differential varieties suitable for identifying the races with which we were familiar, plus 134 selections each carrying genes C and D, were brought to Mexico and on July 1 planted in the Toluca Valley. This area was chosen by Dr. Niederhauser because of the almost daily rains and very cool nights (altitude about 8,500 feet), providing ideal conditions for blight.

The answer to our question "How permanent is the immunity of the CD selections?" was not long in coming. On July 21, blight was first seen in the plot. At that time 25 of the 30 Bintje check plants (susceptible to all races), 2 of the 5 differentials, and 8 of the previously immune "CD" selections exhibited one or more lesions. By July 29, all the checks, all differentials, and 124 of the "CD" selections were infected. Shortly thereafter the last of the "CD" plants developed blight.

As the blight progressed, it became evident that within the previously immune "CD" group there was a considerable range of resistance. At the time the most susceptible of the lot were killed with blight, the most resistant displayed scarcely a half dozen lesions, which were confined to the lower leaves. Although there was a definite decline in resistance as the plants matured, it was rather surprising to find such a high degree of resistance in material unselected for this character.

In addition to observations of the above-mentioned selections, the following species were kept under close surveillance: S. demissum, S. cardiophyllum, S. bulbocastanum, S. boreale, S. stoloniferum, S. pinnatisectum, S. jamesii, S. sambucinum(?), and S. iopetalum. The above species were planted out in a block, with from one to seven clones of each. In addition, very large numbers of S. demissum, the species in which we were especially interested, were observed in the wild state.

With the exception of S. bulbocastanum, blight was found on, and isolated from, all the above species. They ranged from completely susceptible to very highly resistant. The seven clones of S. demissum in the observation block all blighted. On the slopes of the Volcano Popocatepetl, several widely separated areas where this species abounds were kept under observation from July through September. On the first visit, very few blighted plants were found among hundreds examined. But by the middle of September, the majority of the plants were infected, some of which were severely blighted. Collections were made of blighted and blight-free plants.

From the blighted S. demissum plants from Popocatepetl and elsewhere, a large number of isolations of P. infestans were made. At least one of these isolates is so virulent that it produced lesions on every clone of S. demissum tested in the greenhouse, including those which were blight-free when collected. Although not all collections of S. demissum were tested, we consider it doubtful if immunity exists in this species.

In most cases, the infected demissum plants showed a high degree of resistance, expressed by very few, slowly-spreading lesions.

We feel that these observations have considerable significance to breeders who are concerned with blight resistance. Obviously, all races known to occur in the United States, plus an undetermined number of new ones, occur in Mexico. Races of P. infestans which ^{can} attack the species probably could attack any of the progeny evolved in a breeding program. Probably these virulent races will appear eventually wherever resistant varieties are developed, with the performance of the wild species indicating the maximum level of resistance obtainable.

Even without immunity, the high level of resistance found in these species including S. demissum, would be of great practical value if incorporated into a commercial variety. In order to do this, the breeder must necessarily make his selections with the most virulent cultures obtainable. This is demonstrated by the performance of the "CD" selections, only two of which showed a degree of resistance anywhere near approaching that of demissum. It would be very comforting to the breeder to know that a variety, introduced as immune to the races presently known in the United States, would also be highly resistant to those which might develop in the future.

RHODE ISLAND
C. R. Skogley

Twenty-four potato varieties and seedlings were grown for observation and yield at Kingston during 1952. All 24 selections were obtained from U.S.D.A. Station at Presque Isle, Maine. A portion of the data obtained is given in R. I. table 1. Pontiac was the highest yielding selection but was not significantly higher than Katahdin, Ontario, or B 606-67. Pontiac, Ontario, and B 606-67 have given consistently high yields at this station. The standard variety, Green Mountain, made a poor showing and significantly outyielded only 3 of the 24 selections.

The growing season for potatoes in Rhode Island during 1952 was one of the poorest in many years. Although the crop made satisfactory growth during May and June, high temperatures and lack of moisture through July severely hurt the crop. Irrigation water was applied on July 23 and July 30 but only the more drought-resistant varieties responded to the moisture at this date. Over 12 inches of rain fell during the first 2 weeks of August, and the soil was saturated during most of this time. R. I. table 2 gives the rainfall and average temperatures for the 1952 growing season as compared with the normal.

Tuber rot was very serious, reducing yields 1 to 22 percent on the first 17 varieties harvested. There was no rot evident on the last varieties harvested. These varieties were: Pontiac, Katahdin, Ontario, Menominee, Sebago, Sequoia, and Mohawk. The yields as recorded in table 1 do not include the tubers with rot.

There was no late blight reported in Rhode Island during the season. Light traces of early blight were found on all varieties. Mosaic was listed as present in varying percentages on the following selections: Pontiac, Pungo, Sebago, B 69-16, Chippewa, Teton, Cherokee, Keswick, and Russet Rural. Blackleg was noted, severely in some cases, on all varieties but Pontiac, Green Mountain, Teton, Erie, and Earline.

Aphids and flea beetles were the only insects of any consequence reported during the season. The variety, Pungo, was the only selection reported as entirely free of aphid infestation and Sequoia was observed as being free from flea beetles.

A weekly spray schedule was followed using liquid Parzate and 50% wettable DDT. DDT alone was used as the first spray and was omitted from the last. The first spray was applied on June 12 and the last on August 12. Nicotine sulfate was added to the spray materials for additional aphid control in one application during July.

The starch content was unusually low for all varieties this year with a high of 11.7 percent for Mohawk and a low of 7.7 percent for Chippewa. The unusual season plus heavy fertilization may have accounted for the low starch readings.

For the first time in many years the Katahdin variety was superior in yield and almost equal in quality to the Green Mountain selection. Also, the Katahdin was longer in maturing than the Green Mountain.

An 8-12-12 fertilizer at the rate of 2,500 pounds per acre was used in the trial. The test area had been in Sudan grass the previous year and alfalfa for several years prior to the Sudan. The soil is classed as a very fine sandy loam.

Yields were calculated from 32-foot rows, replicated 4 times. The plants were one foot apart in the row, with 3 feet between rows. The potatoes were planted on April 21 and harvested between September 4 and 24.

Rhode Island table 1. Yield and other data on 24 potato varieties grown at Kingston, Rhode Island, 1952.

Variety	Yield U.S. No. 1		Starch	Days to maturity	Tubers	
	tubers per acre				Size	Shape
	Bu.	Pct.	Pct.	No.		
Pontiac	617	96	8.29	153	Large	Medium, regular
Katahdin	596	96	9.85	151	"	Smooth, regular
Ontario	585	87	9.76	156*	Small	Smooth, irregular
B 606-67	484	92	9.43	129	Large	Smooth, knobby
Pungo	478	98	9.78	122	"	Smooth, knobby
Menominee	458	91	9.68	155	Medium	Rough, knobby
Sebago	439	92	8.54	151	"	Smooth, regular
B 355-35	437	92	8.40	130	"	Medium, regular
B 69-16	431	94	9.57	131	"	Smooth, regular
Kennebec	407	93	8.89	123	"	Smooth, regular
Gr. Mountain	402	92	10.36	140	"	Rough, knobby
Sequoia	401	89	8.33	154	"	Smooth, regular
Chippewa	399	94	7.72	133	"	Smooth, regular
Mohawk	392	97	11.70	153	Large	Smooth, regular
Teton	386	93	8.28	138	Medium	Smooth, irregular
X1276-185	373	93	9.04	119	Medium	Smooth, irregular
Warba	368	94	10.70	109	Large	Medium, knobby
Irish Cobbler	326	88	11.00	107	"	Smooth, knobby
Erie	322	92	9.21	116	Medium	Medium, irregular
Cherokee	315	90	9.94	126	"	Smooth, regular
Earlaine	315	92	9.51	116	Large	Smooth, irregular
Keswick	253	93	9.85	130	"	Medium, regular
Canso	246	87	8.87	126	Medium	Smooth, regular
Russet Rural	221	79	10.34	136	"	Medium, knobby

* Not dead when harvested.

135 - LSD at 5% for Bu. Per Acre U.S. No. 1.

180 - LSD at 1% " " " " " " "

Rhode Island table 2. Rainfall and temperature for the 1952 growing season as compared with normal.

	<u>Rainfall</u>					
	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>
	In.	In.	In.	In.	In.	In.
Normal	4.63	3.86	3.46	3.34	4.30	3.90
Actual	3.06	4.18	2.43	.43	13.56	1.17
Departure	-1.57	+ .32	-1.03	-2.91	+9.26	-2.78

	<u>Temperature</u>					
	°F	°F	°F	°F	°F	°F
Normal	44.5	55.0	63.6	69.2	59.9	61.9
Actual	48.4	54.2	65.0	73.5	69.7	61.4
Departure	+3.9	-0.8	+1.4	+4.3	+9.8	-0.5

SOUTH CAROLINA
W. M. Epps and W. T. Scudder

The potato crop in South Carolina in 1952 had a poor start because of excessive rains immediately following planting. Later the season was somewhat dry so that the growth of the tubers was reduced. Disease was not a factor in the trials. Late blight did not appear in the State, and scab was not prevalent in the plots. Blackleg caused some loss of stand in the Sebago variety --probably about 2 to 3 percent. Yields from the replicated variety trials are shown in S. C. table 1.

S. C. table 1. Potato variety yields in South Carolina in 1952.

<u>Variety</u>	<u>Yield per acre</u> Bu.
Pontiac	482
Cherokee	396
Cobbler	373
Sebago	329
Triumph	250
L.S.D. 5% point	54.5
1% "	74.3

As usual, Pontiac gave the highest yield, followed in order by Cherokee, Cobbler, and Sebago. Dry weather resulted in the low yield of Triumph, which suffers more from drought than the other varieties.

Twenty-six seedlings were tested in single-row observational plots. Thirteen of the 26 appeared worthy of further test. The others were discarded because of low yield, roughness, undesirable skin or flesh color, or too heavy a set with many small tubers. Several of these seedlings appear quite promising. Results of this test are given in S. C. table 2.

The Cherokee variety was tested for the first time on a large scale in 1952. Approximately 12 growers planted one or more acres. Each grower, with few exceptions, planted about 40 or 50 bags of Minnesota certified seed. Growers in general found two serious defects in the variety. When the crop was not dug promptly, the yield and quality were reduced due to excessive second growth and soft rot, as was noted in date-of-harvest tests conducted by this station. The growers who dug the crop prior to June 1 were well pleased with the yield and quality. This same defect began to become serious in that part of the commercial Sebago crop harvested after June 15, so it seems that the Sebago might have been just as bad if it had been left as long after maturity as the Cherokee. The unusually late harvest season was a direct result of the O. P. S. price ceiling regulations. The growers left the crop in the ground until a maximum yield had been made, since there was little chance that the price would drop below the O. P. S. ceiling. The second defect noted by the growers was that vine growth was so small that the ground was not/covered, and in some fields weeds became serious enough to interfere with harvesting operations. completely

S. C. table 2. Performance of U.S.D.A. seedlings tested in South Carolina in 1952.

Variety or seedling	Yield per plant	Maturity	Remarks-tuber characteristics	Disposition
	Lb.			
Kennebec	2.21	Mid late	Oval, white, smooth shallow eyes	---
81-113	2.00	Late	Round-oval, white, very large tubers	Save
584	1.25	Mid early	Oval, white, large tubers, medium eyes.	"
1551	1.49	Mid late	Flesh, yellow	Discard
2103	1.81	Late	Long, very smooth, white	Save
580	2.00	Mid early	Long, white, smooth, slightly russeted	"
658	1.86	Early	Yellow-flesh	Discard
81-185	1.39	"	White, rough. Prominent eyes.	"
1823	1.42	Mid late	Round, white, very smooth	Save
1894	1.92	Midseason	Long, white. Eyes medium deep.	"
338	1.58	Early	Oval, smooth, skin russeted.	Discard
2055	1.89	Midseason	Oval, very smooth. Shallow eyes.	Save
2109	1.72	"	Set too heavy, too many size B's.	Discard
2215	1.22	Late	Oval. Shallow eyes. Slightly russeted.	"
2219	1.44	Midseason	Oval-long, white, smooth. Shallow eyes.	Save
2349	1.94	Mid early	Oval-long, white, smooth. Prominent eyebrow	"
2402	0.86	Midseason	Round, white, slightly russeted.	Discard
3061	0.94	Early	Oval, white, smooth, low yield.	"
3273	1.97	Mid late	Long, white, smooth. Shallow eyes.	Save
3600	1.97	Midseason	Oval, white, smooth. Shallow eyes.	"
3911	1.50	Mid early	Long, white, very heavy set, too small	Discard
3969	2.08	Mid early	Oval, white, heavy set, rough.	"
1337	1.88	Late	Oval, white. Shallow eyes. Smooth.	Save
3048	1.31	"	Long oval, white. Low yield.	Discard
3056	2.31	"	Round, red, good color. Shallow eyes.	Save
3060	0.63	Midseason	Round, peach-colored with red eyes	Discard

Four varieties of potatoes, Sebago, Cherokee, Cobbler, and Pontaic, were planted in a date-of-harvest test so that yield, specific gravity, and tuber defect development could be traced throughout the season. The yields and specific gravities on the various dates are shown in S. C. table 3.

S. C. table 3. Yields, specific gravities and dry matter of four varieties of potatoes throughout the growing season. Yields are expressed in bushels per acre of U.S. No. 1 size A potatoes.

Variety, specific gravity, dry matter, and yield U.S. No 1, size A per acre															
Harvest date	Cobbler		Cherokee		Pontiac		Sebago		Date Means						
Yield:Sp. gr.: Dry mat.:Yield:Sp. gr.: Dry mat.:Yield:Sp. gr.: Dry mat.:Yield:Sp. gr.: Dry mat.															
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Pct.
Apr. 16	2	---	23	---	3	---	7	---	9	---	---	---	---	---	---
Apr. 23	61	1.060	108	1.055	52	1.053	44	1.053	66	1.055	14.0	13.8	66	1.055	14.0
Apr. 30	204	1.064	200	1.061	223	1.062	148	1.057	194	1.061	15.4	14.5	194	1.061	15.4
May 7	240	1.077	253	1.070	324	1.068	233	1.066	263	1.070	17.4	16.7	263	1.070	17.4
May 14	286	1.080	314	1.072	348	1.070	308	1.067	314	1.072	17.9	16.9	314	1.072	17.9
May 20	376	1.082	348	1.077	482	1.071	289	1.072	374	1.075	20.2	17.9	374	1.075	18.7
May 27	396	1.077	433	1.074	524	1.065	380	1.069	433	1.071	19.1	17.3	433	1.071	17.7
June 4	387	1.078	405	1.071	565	1.063	425	1.066	446	1.070	19.1	16.7	446	1.070	17.4
June 13	403	1.075	375	1.069	511	1.059	431	1.065	430	1.067	18.7	16.5	430	1.067	16.9
Var. means	---	1.074	---	1.069	---	1.064	---	1.064	---	1.068	---	---	---	1.068	---
L.S.D. 5%	57.1	0.0042	78.1	0.0037	115.4	0.0035	78.3	0.0041	40,6	0.0019					

L.S.D. (5%) Between variety Sp.gr. means 0.0014
 Between variety Sp.gr. means on any given date 0.0037
 Between variety yield means on any given date 81.2

Vines of the four varieties reached a point where 75 to 85 percent of the foliage was dead on the following dates: Cobbler, 85 percent dead on May 20; Cherokee and Pontiac, 75 to 80 percent on May 27; and Sebago 75 percent on June 4.

Maximum yields were obtained in Cobbler and Cherokee by May 27 and in Pontiac and Sebago by June 4. The increase in yield of Cobbler after May 20 was very small. Cherokee and Pontiac showed excessive soft rot and second growth late in the season. The late season drops in yield of these two varieties are due to these defects. Cobbler tubers held up well with little soft rot or second growth. Sebago showed a little soft rot and second growth on June 13. Nematode damage was not evident on any variety prior to June 4. By June 13 nematode damage was moderate to severe on all varieties in spots in the field. These data indicate that potatoes should be dug as soon as possible after maturity since tuber defects increase rapidly when tubers were left in the ground after the vines were dead.

SOUTH DAKOTA

Allyn Cook

Only the four materials giving indications of most promise in the past years were included in the potato fungicide trials at Brookings in 1952. These were Cop-O-Zinc, Dithane Z-78, Phygon-XL and Yellow Cuprocide. The plot was planted with certified Bliss Triumph seed and randomized and replicated four times with 50-foot rows. Between June 18 and September 1 eight applications at the prescribed dosages (with DDT added) were made, with only DDT being applied to the checks. Late blight was never found in the plot, although by the first week in August the whole plot had a moderate infection of early blight. The plot was harvested September 25 but no treatment was found to give a significantly higher yield than any other or the check. Observations of the foliage during the growing season, however, indicated Dithane Z-78 to be the most desirable fungicide.

Twenty-one lines and named varieties were included in a yield plot at Brookings that was randomized and replicated four times with 50-foot rows. Another yield plot with 31 varieties and lines was grown at Garden City, S. Dak., but adverse conditions prevented obtaining reliable data. At Brookings, La Soda produced the greatest yield, significantly higher than Canus, CS6316, Columbia Russet, Kennebec, Progress, Pungo, and Yampa, but not significantly greater than Bliss Triumph, Cherokee, Sequoia, or White Cloud. (South Dak. table 1.). However, Cherokee and CS6316 were decidedly higher in both specific gravity readings and scabresistance. Kennebec and Yampa had less scab at Garden City than La Soda as did Columbia Russet grown at Brookings.

On the basis of the scab trial at Brookings, two lines, #456.1-10 and #458.8-3, obtained from Ben Picha, Grand Forks, N. Dak. were outstanding for both scab resistance and specific gravity measurements.

South Dakota table 1. South Dakota potato yield data.

Variety ^{1/}	Total calc. yield per acre	Sp. gravity	Dry matter ^{2/}
	Bu.		Pct.
La Soda	346	1.080	19.7
Bliss Triumph	318	1.0663	16.7
Sequoia	299	-	-
Cherokee	293	1.098	23.5
White Cloud	281	-	-
B 515-2	279	1.071	17.7
B 962-9	276	1.065	16.5 ^{3/}
Canus	268	-	-
L8-70	264		
45.11-101	261		
Pungo	261		
Columbia Russet	256	1.098	23.5
Kennebec	254	1.096	23.2
2687	243		
Yampa	242	1.089	21.7
B 28-153	242	1.084	20.6
2776	201		
CS6316	197	1.095	22.9
Progress	187		
B 3228	182		
2947	134		
L.S.D.	5% 64.51		
	1% 85.79		

^{1/} Plot planted May 8 and harvested September 25.

^{2/} Converted from specific gravity readings taken October 3 through November 4 from stock at Garden City.

^{3/} Converted from specific gravity readings made from stock grown at Brookings.

EASTERN VIRGINIA

M. M. Parker and T. J. Nugent

The 1952 potato-breeding project in eastern Virginia consisted of:

Observational plantings of some selected seedling lots furnished by the National Breeding Program.

Variety response to a short rest period. Seed was harvested in early July and planted the first week of August.

A comparison of variety resistance to seed piece decay.

Va. table 1 shows the yield response of the named varieties and the seedling selections to favorable soil-moisture conditions at Norfolk and to dry soil conditions during the latter part of the season at Onley. At Norfolk the planting was irrigated throughout the season as needed. At Onley the planting was not irrigated and the last month of the season was characterized by very high air temperatures and low soil moisture. The test at Norfolk gave an indication of the productive capacity of the varieties when moisture was not a limiting factor and the Onley one gave a test of the adaptability of these same varieties to drought conditions.

At both Norfolk and Onley B 606-67 was the highest yielding variety, but produced rather ill-shaped potatoes at both places. At Norfolk most of the tubers had pronounced second growth. Pungo was the second highest yielding variety at Norfolk and was only slightly below the leaders in yield at Onley. Cherokee was the third largest yielding variety at Norfolk but was surpassed by five varieties at Onley, indicating somewhat lack of adaptability.

The most evident lack of adaptability, however, was shown by 1276-185 which produced 298 bushels at Norfolk, but only 95 at Onley. B 515-2 and B 447-98 also were somewhat in this same class. These produced fairly good yields at Norfolk, but rather low ones at Onley. B 355-35 might also be put in this same class but in addition it seemed to respond unfavorably to excess soil moisture. Nearly all of its tubers were covered with enlarged lenticels when grown with irrigation water at Norfolk.

Va. table 1 also shows a comparison of the yield obtained from northern-grown seed and home-grown seed of six varieties. At Norfolk the average yield of the six varieties was 17 percent larger from northern-grown seed than from home-grown seed. At Onley the difference in favor of the northern seed was 9 percent. In only one variety, Kennebec, was the yield from home-grown seed equal to that of northern-grown, and that was at Onley where weather conditions prevented full yield expression.

Va. table 2 gives the yield of several named varieties and seedling selections when grown during the summer months at Norfolk. This planting was made in July and, normally at that time of the year, air and soil temperatures may be highly unfavorable for the healing of the cut surfaces of the seed and for the growth of the plants. Ordinarily, blight is also very destructive in the fall

but because of the high temperatures and low humidity it did not appear in 1952. Under these conditions Kennebec proved to be the most satisfactory variety. It produced yields nearly as large as the highest yielding one and its appearance was superior to the others. Calrose and White Rose produced good yields but their appearance especially the White Rose, was decidedly poor. B 355-35 was the only one of the seedling selections that seemed adapted to summer planting but its tubers, like those from the spring crop lacked good appearance.

Va. table 1. 1952 spring crop potato yields, Norfolk and Onley, Va.

Variety	Source of seed	Calculated yield per acre		Days to maturity
		Norfolk	Onley	
		Bu.	Bu.	No.
Cherokee	Maine	315	155	114
Cherokee	Va. home grown	250	143	114
Cobbler	Canada	278	150	99
Kennebec	Maine	281	195	114
Kennebec	Va. home grown	247	198	114
Pungo	Maine	353	182	99
Pungo	Va. home grown	337	165	99
Sebago	Canada	240	101	114
Sebago	Va. home grown	218	97	114
X1276-185	Maine	298	95	99
X1276-185	Va. home grown	265	85	99
B 355-35	Maine	263	123	144
B 355-35	Va. home grown	135	90	144
B 515-2	Maine	278	112	99
B 447-98	Maine	232	77	99
B 606-67	Maine	397	200	114
B 73-18	Va. home grown	172	165	114

Va. table 2. 1952 fall-crop potato yields, Norfolk, Va.

Variety	Yield per acre
	Bu.
Cherokee	12
Cobbler	47
Calrose	195
Kennebec	187
Pungo	58
Sebago	97
White Rose	154
X 1276-185	62
B 355-35	141
B 606-67	33
B 512-2	21
B 447-98	0

Va. table 3 shows the yield results from seed harvested in early July and planted back the first week of August. Cherokee, Pungo, Sebago, and B 606-67 were the only ones that sprouted promptly and produced some semblance of a yield. Kennebec did not sprout at all.

The seemingly lack of necessity for a long rest period before sprouting for the Cherokee, Pungo, and other varieties was apparent at the time of digging the spring crop preparatory to planting back in the summer. These varieties, due perhaps to climatic conditions, showed sprouts coming through the soil prior to digging.

Va. table 3. 1952 fall crop potato yields, Norfolk, Va. From a planting made from spring potatoes dug in early July and planted the first week of August.

Variety	Yield per acre
	Bu.
Cobbler	8
Cherokee	75
Kennebec	10
Pungo	83
Sebago	87
B 355-35	8
B 515-2	10
B 606-67	87
X 1276-185	12
B 73-18	6
B 447-98	0

Va. table 4 shows the effect of holding cut seed an appreciable length of time before planting. The test was conducted on the spring crop at Norfolk and Onley and on the summer crop at Norfolk. The results are expressed in number of seed pieces that produced plants. At Norfolk cut seed for the spring crop was held 24 days before planting, at a temperature of 70° F. in a room with high humidity. Seed for the Onley planting was also held for 24 days but in an unheated room where temperatures varied from just above freezing to possibly the mid-fifties. Cut seed for the fall crop at Norfolk was held at prevailing outdoor temperatures which sometimes ranged from 90° to 100° for several days at a time.

Where the cut seed was held under conditions favorable for suberization, there was no appreciable difference in the stand of plants between seed cut and held several weeks before planting and that cut and planted immediately. In general, more plants were obtained from the Cobbler than from the Sebago variety. At Onley where the cut seed was held under variable conditions there again was no difference in the Cobbler between seed cut early and that cut just prior to planting, but in the Sebago there was 15 percent more plants from the seed cut and planted immediately afterwards compared to that cut early.

The summer planting at Norfolk showed the biggest difference in variety susceptibility to seed-piece decay. The percentage stand for seed cut early and seed cut late was 33 and 94 for Kennebec; 0.5 and 50 for Sebago; and 25 and 92 for Cobbler. This and other tests made here indicate cut seed of the Kennebec and Cobbler varieties are much less susceptible to decay than the Sebago.

Va. table 4. 1952 potatoes. Effect of time of cutting seed.
Stand count per 100 seed pieces planted.

Location	Varieties			Ave. for time of cutting
	Cobbler	Sebago	Kennebec	
Norfolk (spring crop)				
Cut early	97.5	81.3	--	89.4
Cut at time of planting	<u>95.8</u>	<u>87.9</u>	----	<u>91.9</u>
Average for varieties	96.7	84.6		
Onley (spring crop)				
Cut early	99.0	83.5	----	91.3
Cut at time of planting	<u>97.0</u>	<u>98.3</u>	----	<u>97.6</u>
Average for varieties	<u>98.0</u>	<u>90.9</u>		
Norfolk (fall crop)				
Cut early	24.5	0.5	33.0	19.3
Cut at time of planting	<u>91.5</u>	<u>50.0</u>	<u>94.0</u>	<u>79.0</u>
Average for varieties	58.0	25.2	63.5	

L.S.D. at 5% point.

Norfolk (spring). For varieties 5.6; for time of cutting N.S; for Var. X T.C. N.S. Onley (spring). For varieties 2.1; for time of cutting 2.1; for var. X T.C. 4.3 Norfolk (fall). For varieties 6.6; for time of cutting 5.4; for Var. X T.C. 13.2

Va. table 5 gives the yield from the two times of cutting for three locations. The Cobbler variety planted at Norfolk and grown under irrigation gave a slightly better yield from seed cut early. Sebago, on the other hand, produced 37 bushels more per acre from seed cut and planted immediately than it did from seed held several weeks before planting. Cut seed of this planting had been held under conditions favorable for suberization. At Onley where irrigation was not used and where the cut seed was not held under good conditions, Cobbler cut at planting produced 27 bushels more than seed cut early and Sebago cut at planting produced 50 bushels more than seed cut early.

In the summer planting at Norfolk, Kennebec seed cut at planting produced 228 bushels compared with 100 for seed cut early, Sebago 71 and 0, and Cobbler 44 and 13. This test showed that cut seed of the Kennebec and Cobbler do not require as much care before planting as cut seed of the Sebago.

Va. table 5. 1952 potatoes. Effect of time of cutting seed on yield.

Location	Yield per acre of:			Ave. for time of cutting
	Cobbler	Sebago	Kennebec	
	Bu.	Bu.	Bu.	Bu.

Norfolk (spring)

Cut early	294.7	191.0	---	242.8
Cut at time of planting	<u>277.5</u>	<u>248.0</u>	---	262.6
Average for varieties	286.1	219.5		

Onley (spring)

Cut early	143.3	98.0	---	120.6
Cut at time of planting	<u>170.0</u>	<u>147.6</u>	---	158.8
Average for varieties	156.6	122.8		

Norfolk (fall)

Cut early	12.5	.0	99.5	37.3
Cut at time of planting	<u>43.5</u>	<u>71.5</u>	<u>228.1</u>	114.3
Average for varieties	28.0	35.7	163.8	

L.S.D. at 5% point.

Norfolk (spring) for varieties 22.6; time of cutting N.S.; Var. X T.C. 45.3
 Onley (spring) for varieties 16.1; time of cutting 16.1; Var. X T.C. N.S.
 Norfolk (fall) for varieties 15.5; time of cutting 12.6; Var. X T.C. 31.0

WASHINGTON
S. B. Locke

Potato leaf roll-resistance trials were carried out in 1952 as in preceding years in cooperation with Dr. C. L. Vincent. Twenty-four varieties were exposed to field infection during 1951, and samples from each of the 288 plots were indexed for leaf roll content during the following winter and spring in the greenhouse. The results of the indexing appears in the accompanying table.

Leaf roll spread in the plots was somewhat greater during 1951 than in the preceding year as shown by the location averages.

Of special interest is seedling B 579-3 which showed no leaf roll infection during 1951 and none in 1950. Dr. J. D. Menzies, however, has observed an occasional infection of this seedling with leaf roll virus. Both Essex and seedling X1276-185 have been tested during five seasons, showing a high degree of resistance to field infection and equal to Katahdin in this respect. Progress has also been highly resistant during the two seasons it was tested.

Locke table 1. Percentage increase of leaf roll infection of potato varieties in the field during 1951.

Varieties	Increase of leaf roll content				
	Northwestern Washington (Mt. Vernon)	Central Washington (Prosser)	Eastern Washington (Pullman)	Average of 3 locations	Maximum
	Pct.	Pct.	Pct.	Pct.	Pct.
Ashworth	50.8	66.9	19.7	45.8	66.9
Canus	56.5	68.1	80.8	68.5	80.8
Cherokee	22.8	57.5	31.1	37.1	57.5
Columbia Russet	22.6	68.1	44.0	44.9	68.1
Dakota Chief	6.7	6.7	19.5	11.0	19.5
Essex	3.0	1.1	3.3	2.5	3.3
Katahdin	5.0	1.3	5.4	3.9	5.4
Kennebec	15.5	67.2	48.0	43.6	67.2
Netted Gem	21.2	97.9	88.5	69.2	97.9
Ontario	6.2	30.1	15.5	17.3	30.1
Progress	1.0	3.4	4.1	2.8	4.1
Russet Sebago	18.7	21.9	7.0	15.9	21.9
Satapa	2.0	10.7	15.7	9.5	15.7
Selection A ^{1/}	21.8	3.0	9.8	11.5	21.8
Waseca	22.0	30.6	47.5	33.4	47.5
White Pontiac	55.8	60.8	65.2	60.6	65.2
Yampa	5.1	28.7	13.1	15.6	28.7
B 579-3 ^{2/}	0.0	0.0	0.0	0.0	0.0
CS6316	50.5	58.9	88.8	66.1	88.8
CS8827	39.0	52.6	28.0	39.9	52.6
CS9354	32.7	63.1	39.4	45.1	63.1
45.11-8	4.0	19.4	32.7	18.5	32.7
45.12-3	35.2	59.0	47.6	47.3	59.0
X1276-185	3.6	4.2	0.0	2.6	4.2
Location averages	20.9	36.7	31.4		

^{1/} Seedling selected by Dr. Martin Carstens at Mt. Vernon, Wash., from U.S.D.A. seedlings grown by him.

^{2/} Seedling supplied by Dr. J. D. Menzies, Prosser, Wash.

WASHINGTON
J. D. Menzies

Field-Exposure Tests of Seedlings for Resistance to Leaf Roll

Potato seedlings are tested for field resistance to leaf roll by growing them next to a row of leaf-roll-infected plants with undisturbed natural aphid infestations. The spread of leaf roll to plants of the standard susceptible variety Russet Burbank has, during the past 6 years, ranged from 50 to 98 percent. Seedlings to be tested are planted back each year in plots increasing usually through 1-, 5-, 25-, 50- and 300-hill stages without roguing. Any leaf roll in the first three stages results in rejection of the clone. In later stages traces of leaf roll are allowed, and attention is directed to horticultural characteristics.

Because of the range of leaf roll symptoms appearing in seedling clones, an infected lot may be carried through an extra year or two before it is discarded. Even with over 50 percent probability of infection, susceptible lots can reach the third year free of infection; but the chances of a susceptible clone escaping into the fourth year leaf-roll-free are remote. Obviously, lots that "break down" after such prolonged exposure are not mere escapes. Leaf roll resistance must be a complex quantitative factor. Perhaps it may even vary from year to year and place to place within a clone.

The nature and constancy of leaf roll resistance is still vague, but now that definite progress can be seen we should be working towards some standard method of rating the resistance of varieties. At least there is need for some objective way of deciding in a shorter time than 4 or 5 years whether a clone has useful field resistance or not.

Leaf Roll Resistant Seedlings: We now have four seedlings, B 579-3, WP 57, WP 94, and WP 31, that seem to merit the designation of field-resistant to leaf roll. All have been selected from breeding material sent from Beltsville. All were exposed at least 4 years before leaf roll infection occurred.

B 579-3 was entered into the test in 1948. It is a cross of B 24-58 x Katahdin, the former seedling being the resistant parent derived from Imperia x Earlane. Until this year, leaf roll was not recorded in B 579-3 although a quarter of an acre was grown in an increase plot last year. This year there were 3 diseased units in the exposure test plot of 120 4-hill units and less than 1 percent in another 1/10 acre increase block. Chronic leaf roll is easily detected in this variety, but current-season symptoms may be difficult to diagnose. No current-season leaf roll was recorded this year.

B 579-3 has been included in State-wide test plots during the past 2 years (see Vincent's reports 1951, 1952). As far as appearance, yield, and quality are concerned, B 579-3 is very promising. Its scab susceptibility, however, is very high and may preclude its acceptance as a variety.

WP 57 and WP 94 are sibs from cross number B 2291 (Virgil x B 522-33). Both of these have been grown without roguing for 511 hill-years. Neither seedling showed any leaf roll symptoms during the first 4 years. This year WP 57 contained 3/269 (1.1%) chronic leaf roll, and 4/269 current-season infections were recorded. WP 94 contained no chronic leaf roll, but 5/304 hills showed symptoms of current-season infection.

WP 31 is another selection from the same series. It is a Beltsville cross (B878) of 1276-185 x 96-56 both of which were selected as leaf-roll resistant parents. This seedling showed neither chronic nor current-season symptoms this year, but it is an early-maturing sort and may have escaped much of the exposure. The tubers of this seedling are too small for commercial promise, but the clone has been saved for breeding material.

Tests of Other Seedlings. Six other seedlings from the same group as the last three mentioned above were discarded this year. Five were discarded because of a high percentage of chronic leaf roll. When seedlings survived 4 years only to go down in the fifth because of chronic leaf roll, it is most likely that infections occurred but missed detection in previous years.

Seedlings from Maine. A number of the more promising seedlings of the 1950 crop from Highmoor Farm were sent to Dr. S. B. Locke. These were increased by Dr. Locke at Pullman, and were tested for leaf roll this year. There were 46 clones in this group, many of which had resisted infection in the Aroostook Farm aphid-inoculation test, and all had shown field resistance to leaf roll for several years at Highmoor Farm. Leaf roll, either chronic or current-season, occurred this year in all but 12 of these. These survivors are:

B 751-119
B 577-132
B 583-66
B 959-10

B 942-2
B 2081-15
B 2187-116
B 2187-113

B 2150-10
B 2165-19
B 2187-15
B 1136-2

Seedling Clones from Beltsville. This year six clones were sent from Beltsville for leaf roll exposure tests in five-hill units. These were B 2925-23, B 2925-38, B 2938-22, B 2946-5, B 2946-6, and X 927-3. None of these showed any leaf roll symptoms during the season except X 927-3. The five survivors have been saved for further testing.

Seedlings Advanced to 25-hill Lots. Thirty-eight clones that survived a five-hill leaf-roll-exposure test last year were retested. All of them were discarded because of leaf roll except A-101-13. This one is from a Russet Burbank x Menominee cross made by John McLean at Aberdeen, Idaho. Thirty-nine clones from the same cross have been eliminated because of leaf roll in the past 2 years.

Seedlings Tested in Five-hill Lots: Besides the six samples from Beltsville, family-line clones from four crosses of russet x leaf-roll-resistant parents were grown in five-hill units. The crosses and survival results are shown in Washington table 1.

Washington table 1. Survival of progeny of four crosses tested for leaf roll resistance in five-hill units.

Cross No.	Pedigree	Clones tested	Clones surviving
B 2761	B 157-9 x B 759-64	9	1
B 2766	B 582-33 x B 157-9	13	2
B 2762	B 247-48 x B 157-9	17	7
B 2700	B 859-14 x B 157-9	16	11

Summary: Our field-exposure test has been operating 7 years, and 4,726 seedlings or varieties have been screened. Of these, 33 are still being tested and 4 are designated as highly resistant to leaf roll. The 0.1 percent survival is not high when most of the horticultural selection still remains to be done. One possibility is that the standards are too severe and could be lowered to permit acceptance of less resistant material. There is also a justified hope that the continuing improvement of parent lines will lead to an increasingly higher percentage of survival.

WASHINGTON (Prosser)

J. D. Menzies

Notes on Scab Reaction of Named Varieties and Better Seedlings
Tested at Moses Lake, Washington, 1952

The test plots were on Ephrata sandy loam, pH 6.5 to 7.0, third year in cultivation, previous 2 years in potatoes. 1951 crop too scabby to harvest--dug but left on surface over winter. Frozen tubers thoroughly disced in spring before land preparation. No volunteers survived.

Scab index is estimate of average percentage of surface of tubers covered by scab lesions.

	Scab Index
<u>Ontario:</u> Late; tubers small and rough-----	10
<u>Seneca:</u> Scab erumpent, not pitted, inconspicuous-----	20
<u>Russet Sebago:</u> Scab superficial or erumpent-----	30
<u>Progress:</u> Very scabby; pitting and cracking-----	50
<u>Russet Burbank:</u> Heavy confluent scab erumpent and pitted--	60
<u>Monominee:</u> Tubers late and rough; scab superficial but some pitting-----	10
<u>Cayuga:</u> Scab tended to heavy russet type, all superficial	25
<u>Sebago:</u> Scab lesion large, rough and pitted-heavy scab--	50
<u>Cherokee:</u> Least scabby of named varieties; lesions very superficial and rare-----	2
<u>White Rose:</u> Confluent heavy scab with pitting-----	60
<u>B 3015-23:</u> Scab smooth or slightly erumpent-----	20
<u>B 402-1:</u> Tubers small and late but almost scab-free-----	1
<u>B 3014-15:</u> Scab lesions inconspicuous due to feathery russetting -----	15
<u>B 2900-42:</u> Scab lesions few and superficial; a promising seedling but dimpled bud end detracts-----	10
<u>B 73-10:</u> Best looking of all; scabs rare and superficial, blending with natural russet-----	1
<u>B 2879-5:</u> An interesting, slightly russeted, pale-red potato; very resistant, scab lesions inconspicuous and superficial-----	2

Washington table 2. Uniform scab nursery, Washington - 1952 (J.D. Menzies)

Variety	Color	Replication 1 ^{1/}				Replication 2 ^{1/}			
		Seedling		Check ^{2/}		Seedling		Check	
		Ar	Ty	Ar	Ty	Ar	Ty	Ar	Ty
B 73-10	W	1	2	5	4	2	2	5	4
B 402-1	W	2	2	5	4	1	2	5	4
B 515-2	Rus	1	2	3	4	1	2	4	4
B 595-76	W	2	3	4	4	2	2	5	4
B 904-6	W	4	3	5	4	4	3	5	4
B 2067-1	R	2	4	4	4	4	4	4	4
B 2131-3	R	3	4	4	4	3	4	4	4
B 2162-18	R	1	1	5	4	1	1	5	4
B 2162-36	R	1	2	4	4	1	2	4	4
B 2162-49	R	1	2	4	4	1	2	5	4
B 2331-1	R	4	3	5	4	3	3	5	4
B 2340-2	R	5	4	5	4	5	4	5	4
B 2368-6	R	5	4	5	4	5	4	5	4
B 2368-13	R	3	2	4	4	3	3	5	4
B 2369-4	R	2	3	5	4	3	3	5	4
B 2361-1	R	3	3	4	4	4	4	4	4
B 2874-3	R	2	3	4	4	3	3	5	4
B 2874-4	R	2	3	5	4	5	4	5	4
B 2879-5	R	1	2	5	4	2	3	5	4
B 2888-2	W	-	-	-	-	3	2	4	4
B 2892-3	W	4	5	4	5	4	4	5	4
B 2893-11	W	5	4	5	4	4	5	5	4
B 2900-24	W	4	3	5	4	1	2	3	4
B 2900-42	W	3	2	5	4	3	3	5	4
B 2900-54	W	4	4	4	4	3	3	4	4
B 2914-1	w	5	4	5	4	5	4	5	4
B 2920-13	W	1	2	4	4	1	3	5	4
B 2920-20	W	2	3	4	4	2	3	5	4
B 2921-4	W	2	2	5	4	-	-	-	-
B 2921-10	W	4	3	5	4	5	3	5	4
B 2922-15	W	3	3	4	4	4	4	5	4
B 2922-26	W	5	4	5	4	5	4	5	4
B 2922-29	W	3	3	5	4	5	4	5	4
B 2924-2	W	2	2	5	4	3	3	5	4
B 2935-7	W	2	2	5	4	3	3	5	4
B 2968-56	W	5	4	5	4	5	4	5	4
B 2968-66	W	-	-	-	-	5	4	5	4
B 2969-12	W	4	4	5	4	5	4	5	4
B 3003-27	W	3	3	5	4	4	5	5	4
B 3003-26	W	1	2	5	4	3	2	5	4
B 3004-9	W	5	4	5	4	5	4	5	4
B 3008-10	W	3	4	5	4	4	4	5	4
B 3009-7	W	2	2	5	4	-	-	-	-
B 3009-9	W	1	2	5	4	1	2	5	4

Washington table 2 continued

Variety	Color	Replication 1 ^{1/}				Replication 2 ^{2/}			
		Seedling		Check		Seedling		Check	
		Ar	Ty	Ar	Ty	Ar	Ty	Ar	Ty
B 3014-6	W	5	4	5	4	5	4	5	4
B 3014-15	W	4	4	5	4	4	4	5	4
B 3015-23	W	2	4	5	4	2	4	5	4
Neb. 59.41 PI	R	3	3	5	4	3	3	5	4
N.D. B 2336 NI	W	5	4	5	4	5	4	5	4
N.D. 457-1	W	5	4	5	4	4	4	5	4
M 304		3	3	5	4	2	3	4	4
M 330		2	3	5	4	4	3	4	4
M 439		3	2	3	4	3	2	3	4
M 804		4	4	4	4	5	4	5	4
303.41-4		5	3	5	4	5	4	4	4
303.41-40		4	4	5	4	4	4	4	4
Cayuga	W	2	2	4	4	3	3	5	4
Cherokee	W	3	3	5	4	2	3	5	4
Menominee	W	2	2	5	4	2	2	5	4
Ontario	W	4	3	5	4	4	3	5	4
Progress	R	5	4	5	4	5	4	5	4
R. Burbank	Rus	5	4	5	4	5	4	5	4
R. Sebago	Rus	4	4	4	4	4	4	5	4
Sebago	W	3	4	4	4	4	4	4	4
Seneca	W	4	3	5	4	4	3	5	4

^{1/} See footnote in Plant Industry table 11.

^{2/} Check = White Rose.

WASHINGTON (Pullman)
C. L. Vincent

Yielding ability of the several potato varieties grown in Whitman, Yakima, and Skagit Counties of Washington in 1952 is shown in table 1. Katahdin and Netted Gem (Russet Burbank) are planted every year as the check varieties as each is well adapted to the climatic conditions prevailing in the several sections. The highest yields for all varieties were obtained in Yakima Valley (Prosser) where water was available for irrigation. In Skagit (Mt. Vernon) and in Whitman (Pullman) Counties, no water is available for irrigation, except that obtained as rain. The potato plantings received the same amount of ammonium nitrate at each of the three locations. In addition, the plot at Prosser was located on land that had been in clover sod for 4 years before being planted to potatoes, whereas the potatoes at the other two locations were planted on land that had been planted to vegetables the previous year.

In 1952 LaSoda was an outstanding variety based on yield and tuber appeal under Prosser growing and handling conditions. Its over-all yield for the three growing areas was very high but little better than Cherokee, Canago, and CS 9687. Canago was the most attractive of the white-skinned varieties in the plantings based on size, smoothness, color of skin, and over-all yield. It has a clear appearance, good size and shape, and shallow eyes. Kennebec continued to be an attractive, high-yielding variety, as did Menominee and Cherokee. The latter variety, while productive, is a trifle too rough compared with Katahdin and Canago. N.D. 457, a variety obtained from the North Dakota Experiment Station, is promising.

B 515-2, an early variety similar to Netted Gem in appearance, appears to be a promising variety when irrigation is available. This variety is not quite as early as the Warba strains but is not as subject to scab as the Warba. When grown side by side, both Warba and Red Warba were badly infected with scab, whereas B 515-2 was comparatively free from it. B 515-2 has a skin similar to that of Netted Gem but is somewhat less attractive than the latter. CS6316 is an attractive long, white-skinned, shallow-eyed potato but has never yielded as high as many other varieties grown under the same conditions.

Specific gravity readings (Vincent table 2) are high this year for all varieties compared with readings taken of the same varieties grown in the same locations in 1951. In 1952 all specific gravity readings were made by use of the potato hydrometer put out by the National Potato Chip Institute.

From specific gravity determinations made to date by the writer, it is questionable as to how much value can be placed on such readings insofar as "eating quality" ratings of potatoes are concerned. Specific gravity is affected by so many factors connected with the growing of potatoes that it seems doubtful that one can say a potato is good for baking, for boiling,

or for mashing simply because it has a high specific gravity reading. Other factors must be considered along with specific gravity to rate a variety correctly, and even then it will depend on where and how the potatoes were grown.

Vincent table 1. The average yield of some potato varieties from replications grown at three locations, 1952.

Variety	Location and yield per acre			Average yield per acre for the 3 places
	Prosser	Mt. Vernon	Pullman	
	Tons	Tons	Tons	Tons
Kennebec	26.6	15.4	17.8	19.9
Katahdin	19.6	14.6	15.6	16.6
Menominee	22.4	19.2	18.2	19.9
Netted Gem	21.2	14.4	21.9	19.2
Cherokee	28.8	20.2	17.3	22.4
Canago	24.7	18.7	18.7	20.7
Warba	22.3	16.1	15.7	18.0
Red Warba	26.4	13.8	16.6	18.9
Sebago	23.4	16.2	16.3	18.6
LaSoda	30.3	16.9	17.8	21.7
Yampa	17.4	12.7	13.8	14.6
N.D. 457	21.9	14.3	18.0	18.1
2911	18.8	12.4	16.8	16.0
B 137-5	19.1	15.8	13.3	16.1
B 922-21	18.6	12.6	14.4	15.2
B 579-3	18.3	13.5	11.4	14.4
B 515-2	20.7	10.8	13.4	15.0
CS6316	17.3	13.9	15.6	15.6
CS9887	29.8	17.1	19.1	22.0
CS10287	19.9	12.9	16.3	16.4

Vincent table 2. Specific gravity determinations^{1/} of some potato varieties grown in three sections of Washington in 1952.

Variety	Varieties grown at:					
	Prosser		Mt. Vernon		Pullman	
	Sp.gravity	Dry matter	Sp.gravity	Dry matter	Sp.gravity	Dry matter
		Pct.		Pct.		Pct.
Canago	1.094	22.7	1.105	25.0	1.102	24.4
Cherokee	1.095	22.9	1.090	21.9	1.097	23.3
Katahdin	1.096	23.1	1.093	22.5	1.109	25.9
Kennebec	1.093	22.5	1.098	23.5	1.104	24.8
LaSoda	1.089	21.6	1.092	22.2	1.098	23.5
Menominee	1.095	22.9	1.094	22.7	1.097	23.3
Netted Gem	1.088	21.4	1.095	22.9	1.100	24.0
Red Warba	1.091	22.0	1.095	22.9	1.090	21.9
Sebago	1.076	18.9	1.098	23.5	1.108	25.7
Warba	1.094	22.7	1.090	21.9	1.089	21.6
Yampa	1.075	18.6	1.094	22.7	1.103	24.6
White Rose	-	-	1.091	22.0	-	-
N.D. 457	1.089	21.6	1.108	25.7	1.099	23.8
2911	1.089	21.6	1.096	23.1	1.101	24.2
B 137-5	1.087	21.2	1.076	18.9	1.101	24.2
B 515-2	1.082	20.1	1.078	19.2	1.075	18.6
B 579-3	1.097	23.2	1.100	24.0	1.108	25.7
B 922-21	1.075	18.6	1.072	17.9	1.087	21.2
CS6316	1.094	22.7	1.095	22.9	1.095	22.9
CS9887	1.073	18.2	1.071	17.8	1.085	20.7
CS10287	-	-	1.090	21.9	1.096	23.1

^{1/} Determinations made with hydrometer of the National Potato Chip Institute.

WEST VIRGINIA

K. C. Westover, M. E. Gallegly, M. E. Marvel

The testing and selection work for such horticultural characteristics as yield, plant, and tuber types and starch content were done at the Reedsville Experiment farm at Reedsville, W. Va., by the Department of Horticulture. The disease-resistance work, was carried on at Huttonsville, W. Va., and in the pathological greenhouses at the university by the Department of Plant Pathology. Special effort was made during the year to assess the resistance of the promising varieties and seedling stocks to late blight and common scab. Some attention was also given to the reaction of certain varieties to W. R. Mills' collection of blight races, but not enough to report at this time.

Weather conditions at the Reedsville Farm were generally favorable permitting uninterrupted cultural and spray operations. Other than abnormally low rainfall, the same was true for Huttonsville, resulting in a low incidence of late-blight infection. All the plantings at Reedsville were on well-drained sandy or silty loam soils in good tilth. A 1600-pound application of 5-10-10 commercial fertilizer mixture was applied bandwise at planting time. The planting was killed September 15 and harvest started 20 days later. Specific gravity determinations were made immediately at harvest. The plantings at Huttonsville was on a well-drained, productive soil and was fertilized bandwise at planting time with 1400 pounds of a 5-10-10 mixture.

Family Line Planting. Seven families from Beltsville and 31 from Iowa (screened for resistance to the common race of late blight) totalling 4,500 seedlings were planted, and 133 selections have been retained.

10-Hill Unit Planting. From the families grown in 1951 140 seedling units were selected and planted in 1952. The unit hills were 20 inches apart and the units 50 apart in the row. Check units of certified Cobbler and Sebago occurred alternately every third unit and were "staggered" so that each seedling unit was flanked by one of the check varieties and not more than a row removed from the other. W. Va. table 1 lists 25 of the higher yielding of the 40 selections retained for next season's work. Specific gravity determinations on a 10-tuber sample from each unit were made.

50-Foot Row Planting. This planting comprised a single 50-foot row of each of 63 seedstocks of which 32 were seedling selections from Beltsville, 18 were made from Beltsville and Iowa family lines, and the remaining were recently named varieties. Twenty-six of the seedlings --14 Beltsville selections and 12 made here--have been retained for further trials. W. Va. table 2 summarizes the data on these stocks. Duplicate 10-tuber samples from each were used for specific gravity determinations.

Replicated Planting A. This trial comprised four replications of 50-foot single-row plots of each seedstock in an incomplete block (lattice) arrangement. With the exception of a sample each of certified Cobbler and Kennebec, all had been grown here more than a year. W. Va. table 3 shows the high-yielding varieties to substantially be the same as in the past several seasons.

In general, the performance of the seedling stocks was much less consistent.

Replicated Planting B. This planting at Huttonsville consisted of six 20-foot single rows of each of 29 varieties randomized in complete blocks. W. Va. table 4 shows the yield and reaction to common scab and to the common race of the late-blight fungus. The blight tests were made in the greenhouse, whereas the scab tests were made in the field at Morgantown.

W. Va. table 1. Yields, starch readings, and disease resistance information from replicated potato trials, Reedsville Experiment Farm, 1952.

Variety	Parentage	Yield per acre		Off-grade	Starch	Reaction to	
		No. 1's	Off-grade			L. blight	Scab
		Bu.	Bu.	Pct.	Pct.		
Essex		674.9	47.4	7.0	10.45	R	
Pontiac		603.1	48.2	7.4	11.00	S	S
Kennebec Cert.	B 127 x 96-56	543.6	41.8	7.1	12.74	R	S
Ashworth		538.9	28.7	5.1	13.37	R	R
Kennebec		522.3	57.6	9.9	12.58	R	S
Houma		518.8	44.1	7.8	12.50		S
B 2431-64	Chippewa x B 445-41	497.7	49.0	9.0	13.66	R	S
Cobbler		495.5	46.9	8.6	13.23	S	S
Katahdin		492.5	32.5	6.2	12.97	S	S
B 2069-74	Chippewa x (X528-170)	461.9	45.6	9.0	11.56	S	R
Cobbler Cert.		459.3	49.0	9.6	12.89	S	S
B 2070-10 WVa.	Chippewa x B 594-46	455.4	43.9	8.8	14.68		R
Canoga		454.6	68.7	13.1	13.63		
Menominee		449.8	33.8	7.0	13.46	S	R
B 2427-33 WVa	Chippewa x Katahdin	434.9	44.8	9.3	14.11	S	S
B 2390-6	B 606-37 x B 607-56	430.7	44.6	9.4	11.99	S	S
B 2070-14 WVa	Chippewa x B 594-46	416.5	73.3	15.0	14.25	S	S
B 2147-14 WVa	B 245-186 x B 522-33	412.0	48.3	10.5	12.74	S	S
B 2346-3 WVa	528-170 x B 76-23	395.6	33.3	7.8	14.49	R	R
Sebago		387.2	42.1	9.8	11.92	S	
Chippewa		376.4	55.1	12.8	11.26		S
B 2428-59	Chippewa x Cherokee	375.8	80.7	17.7	13.85	S	R
B 607-56	B 83-9 x Teton	369.3	34.6	8.6	13.31	S	S
B 2427-39 WVa	Chippewa x Katahdin	305.6	43.9	12.6	10.00	S	
B 2070-30 WVa	Chippewa x B 594-46	273.6	174.8	39.0	14.94	R	R
L.S.D. 1%		154.0			1.698		
L.S.D. 5%		115.5			1.273		

W. Va table 2. Yields, starch readings, and disease resistance information from selections from 50-foot row plantings, Reedsville Experiment Farm, 1952.

Variety	Parentage	Yield per acre		Off-grade	Starch	Reaction to	
		No. 1's	Off-grade			L. blight	Scab
		Bu.	Bu.	Pct.	Pct.		
Cobbler Cert.	Av. 17 checks	454.6	48.0	9.6	13.16	S	S
Sebago Cert.	Av. 18 "	431.7	36.7	7.8	13.19	S	
I 933-4 WVa	B 607-72 x M 113.43	737.6	94.4	11.3	13.81		SR
B 69-16	Katahdin x 96-56	623.4	25.6	3.9	13.40		
Canso		599.7	25.6	4.1	14.38		
B 3027-17	B 929-6 x B 724-1	585.2	77.9	11.7	14.11		
B 605-10	Pungo x 96-56	567.4	17.5	3.0	13.57		
I 956-2 WVa	7137 x B 61-3	563.9	52.2	8.5	13.85		S
Seneca	Chippewa x Katahdin	557.1	15.0	2.6	11.97		R
B 2346-24 WVa	B 528-170 x B 76-23	553.7	21.8	3.8	14.90	R	R
B 2919-1	B 607-56 x B 355-24	526.6	9.7	1.8	15.39		
Keswick		516.4	16.0	3.0	13.23		
B 2067-96	Chippewa x B 381-2	515.9	47.9	8.4	10.00	S	S
B 355-44	96-56 x Saranac	510.6	30.5	5.6	16.65		
B 2858-5 WVa	B 381-2 x Katahdin	508.7	45.5	8.2	14.00		S
I 933-10 WVa	B 607-72 x M 113.43	501.4	50.8	9.2	15.03		
Snowdrift		486.4	28.1	5.5	12.05		
B 2427-8 WVa	Chippewa x Katahdin	485.5	30.9	6.0	12.78	S	R
B 2924-8	B 608-56 x B 594-46	481.1	43.6	8.3	10.38		
Pungo	96-44 x 528-170	477.7	34.9	6.8	11.73	R	S
B 2911-32	B 446-54 x Teton	476.7	31.0	6.1	13.36		
B 313-21	Sequoia x 96-56	475.8	12.1	2.5	12.71	R	
B 922-3	TI5 x B 355-24	474.3	30.5	6.0	10.00	R ^{1/}	S
Virgil		473.8	14.6	3.0	12.44	R	
Ontario		458.8	53.8	10.5	12.95	S	R
Saranac	President x Katahdin	455.9	56.2	11.0	12.54		
I 970-4 WVa	N 43.41-1 x B874-25	455.9	48.9	9.7	12.89		S

^{1/} Resistant to all Mill's races except race BC.

W. Va. table 3. Yields, starch readings, and disease resistance information from 10-hill unit plantings, Reedsville Experiment Farm, 1952.

Variety	Parentage	Yield per acre		Off-grade	Starch	Bred for resistance to
		No.1's	Off-grade			
		Bu.	Bu.	Pct.	Pct.	
Cobbler Cert.	Av. 34 checks	287.5	42.2	12.8	11.94	
Sebago "	Ave. 31 "	226.8	25.0	9.9	12.56	
I 915-2	B 76-23 x M 113.43-1	576.3	9.1	1.6	14.43	
I 916-6 WVa	" x N 117.43-3	575.5	45.6	7.3	15.03	Scab, LB
I 916-2 "	" x "	505.5	29.6	5.5	14.77	" "
I 894-6 "	1276-185 x B 67-11	498.5	84.7	14.5	10.77	" " LR
B 3095-2 "	Houma x Triumph	479.2	33.8	6.6	14.79	Virus A, LR, Vert W
I 905-1 "	B 595-76 x N 117.43-3	428.3	38.8	8.3	16.37	Scab, LB, X
B 3095-13"	Houma x Triumph	417.5	6.0	1.4	13.44	Virus A, LR, Vert W
B 3095-3 "	" x "	386.0	20.6	5.1	14.02	"
I 8168-1	6316 x B 766-48	382.4	71.7	17.6	10.00	
I 924-1 WVa	B 96-56 x M 34.44	379.9	26.7	6.6	13.37	Scab, LB
I 8150-3 "	B 754-9 x B 61-3	378.7	25.4	6.3	13.23	" "
I 922-1 "	B 773-27 x M 117.43.3	369.8	38.9	9.5	13.31	" "
B 3096-6 "	Houma x B 572-92	365.4	78.7	17.7	10.81	Virus A, LR
I 913-2	B 76-23 x B 67-11	353.3	37.5	9.6	13.57	LB
I 801-2 WVa	B 595-76 x B 67-11	342.4	70.2	17.0	13.98	Scab, LB, LR
I 942-1	B 1123 x B 61-3	336.4	37.5	10.0	12.63	" " ,RR
B 3095-1 WVa	Houma x Triumph	323.1	31.4	8.9	15.07	Virus A, LR Vert W
I 961-1	6316 x B 96-56	321.9	21.7	6.3	15.05	
I 811-1	B 595-76 x 6316	318.6	20.2	6.0	14.04	LB, Virus X, Scab
B 3095-5 WVa	Houma x Triumph	311.0	36.3	10.5	13.06	Virus A, LR. Vert W
I 8116-11 "	6316 x B 67-11	309.3	28.2	8.4	13.14	Scab, LB
I 914-2 "	B 76-23 x B 96-56	304.9	12.1	3.8	11.41	" "
I 894-2 "	1276-185 x B 67-11	300.1	15.7	5.0	14.11	" " , LR
I 8116-1 "	6316 x B 67-11	290.4	47.4	14.0	17.08	" "
B 3096-3 "	Houma x B 572-92	286.8	21.8	7.1	15.57	Virus A, LR.
B 3132-1 "	B 606-37 x (X 157-9)	274.3	43.0	13.6	11.28	Russet, Virus X, LB
I 894-8 "	1276-185 x B 67-11	268.6	47.6	11.4	13.85	Scab, LB, LR
B 3092-2 "	Chippewa x B 929-6	265.	44.8	14.5	18.22	Virus A&Y, Scab, LB

W. Va. table 4. Yield and disease resistance information from replicated trials at Huttonsville, 1952.

Variety	Yield per acre		Reaction to	
	Total	No. 1's	Late blight	Common scab
	Bu.	Bu.	Pct.	Pct.
Sequoia	460	396	S	
Seneca	389	345	S	R
Essex	347	306	R	
B 604-18	311	272		
Cobbler	312	263	S	S
Virgil	329	256	R	
Kennebec	303	245	R	S
Pungo	275	241	R	S
Katahdin	259	238	S	S
B 2431-64	301	231	R	S
B 313-21	254	228	R	
B 446-8	304	227	R	
Chenango	286	218	R	
B 924-2	236	204	R	R
Menominee	284	191	S	R
Cherokee	244	190	R	R
Ashworth	211	190	R	R
B 922-6	221	187	R	
Sebago	208	185	S	
B 2346-20 WVa	217	176	R	S
B 2346-30 WVa	263	175	R	R
B 2070-30 WVa	256	169	R	R
B 2433-22 WVa	286	138	R	R
L.S.D. 19:1	108.1	97.6		
L.S.D. 99:1	142.5	128.7		

Periderm Development of the Potato Tuber and its Relationships to Scab Resistance

It is well known that potato varieties differ in their susceptibility to common scab. Some varieties, e.g., Hindenburg and Ontario, are noted for their resistance to the inciting organism, Streptomyces Scabies. Other varieties like Chippewa, Irish Cobbler, Katahdin, Pontiac, and Triumph are highly susceptible to it. When varieties of the two types are grown in test plots under conditions favorable for infection there will be an occasional lesion on some tubers of the resistant varieties, whereas the tubers of the susceptible varieties will be more or less covered with scab lesions.

There is a marked difference in the nature of the periderm of a developing tuber from a resistant variety as compared with that from a susceptible variety. The peripheral layers of periderm cells of tubers from resistant varieties regularly disintegrate and are being shed continuously during the course of tuber enlargement. As a result, the periderm is composed of layers of living, nucleated cells and the number of layers of such cells remains relatively constant throughout the course of tuber development. The peripheral periderm layers on tubers of susceptible varieties collapse and persist as a dead tissue. Such layers break apart during the course of tuber development so that irregularly shaped masses of dead cells ranging from a few to 20 or more layers in thickness adhere to the surface of the tuber. Apparently this defunct tissue constitutes a satisfactory medium for the growth of the scab-producing organism.

The technique for checking the nature of the periderm is a simple one. A very thin, free-hand anticlinal section is made through the peripheral portion of a fresh tuber. The section is placed in a drop of aceto-carmin or aceto-orcein on a clean slide and a cover glass is put in place. The preparation is slightly warmed over an alcohol flame and is then ready for examination. The nature of the periderm is easily checked.

Tubers of various potato varieties and seedlings have been examined to determine whether one of the two types of periderm development is regularly associated with resistance or susceptibility. Young tubers, one to two centimeters in diameter, were collected from plants growing in the greenhouse at Madison and in the scab nursery at Antigo. The nature of the periderm was determined for tubers from 35 plants representing 27 varieties and seedlings. When these findings were checked against the scab readings it was found that a periderm composed of living cells is regularly associated with resistant varieties and a periderm with an outer mantle of collapsed, dead cells is associated with susceptibility.

One of the factors that is delaying the development of more scab-resistant varieties is the lack of a critical diagnostic test at the seedling level. It appears probably that periderm readings could be taken as evidence for the probable reaction between the particular plant and the pathogen. If so, scab-resistant lines could be selected early in the course of a potato-breeding program.

WISCONSIN

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Incidence of Physiological Internal Necrosis

Field tests for resistance and susceptibility to the nonparasitic internal tuber necrosis were continued at the Hancock Substation during 1952. Nine standard potato varieties and four seedling varieties were compared, and the indices are given in the Larson-Akeley table 1.

Larson-Akeley table 1. Occurrence of internal tuber necrosis in seedling and potato varieties.

<u>Variety</u>	<u>Necrosis Index</u> ^{1/}
B 73-10	1.1 ^{2/}
B 515-2	1.1
B 606-67	1.8
B 355-44	3.6
Triumph	0.0
Canso	.5
Cherokee	1.2
Kennebec	2.8
La Soda	3.4
Pungo	3.7
Keswick	7.3
Katahdin	20.0
Ontario	40.1

^{1/} Randomized sample of 300 tubers from a 200-ft. planting.

^{2/} Index: 100 = All tubers with severe internal necrosis.
0 = All tubers free of internal necrosis.

Internal necrosis was found in 1952 in seedlings and in Ontario in the Rhinelander area, and in Ontario in the Racine-Kenosha area.

Relationships Between Potato Leaf-Roll Virus Strains

R. E. Webb, R. H. Larson, and J. C. Walker

These investigations were initiated to study the potato leaf-roll virus by determining (1) some of the causes underlying the variable response of potato varieties under comparable conditions and (2) the possible existence of strains.

The peach aphid, Myzus persicae Sulz., was used in making all virus transfers.

Physalis floridana Rybd. proved to be very susceptible to infection and reacted to the virus in 6 to 8 days at 24° C. This host was used as an indicator plant for the presence of the virus, as well as for isolate or strain evaluation.

Plants from 148 single-tuber leaf-roll isolates from the major potato-growing areas of the United States and Canada were evaluated. These plants were colonized with virus-free aphids for 3 days, after which the viruliferous aphids were transferred to young P. floridana plants for a 3-day feeding period, then killed.

Response of Physalis floridana to the virus from each isolate was evaluated on the basis of severity of leaf chlorosis, leaf roll, leaf epinasty, petiole epinasty, and twisting and general plant stunting. The number of viruliferous aphids or their relative length of feeding, both on the virus source or the indicator, did not affect the response of P. floridana to the virus from an isolate source.

Evaluation of isolates on the basis of severity of reaction on Physalis floridana, temperature relations, and cross protection inoculations established the existence of four strains of the virus. While the isolates within each group were not regarded as identical, they were similar enough, within the limits of the criteria at hand to distinguish them, that a type isolate from each group was selected for further work. These type isolates were referred to as strains 1, 2, 3, and 4, respectively.

Physalis floridana plants infected with strain 1 showed mild chlorosis, mild to moderate leaf roll, petiole epinasty and twisting, and mild plant stunting. Plant recovery was rapid. Strain 2 incited moderate chlorosis, leaf roll and epinasty, petiole epinasty, and twisting and stunting of the plant. Recovery and growth were decidedly less than with strain 1. Chlorosis, leaf roll, leaf and petiole epinasty, and twisting caused by strain 3 were severe, and there was little recovery and subsequent growth. Strain 4 incited very severe symptoms, and plants defoliated 16 to 18 days after infection and were dead a few days later.

Strains 1, 2, and 3 were found in most potato-growing areas, strain 4 being isolated thus far from two areas: Clark, S. Dak., and Windlake, Wis.

Temperature relationships of the 4 strains were shown to vary, however, time of initial symptom expression was consistent at a given temperature. Strains 1, 2, and 3 made characteristic recovery and subsequent growth at 16°, 20°, 24°, and 28° C., but strain 4 caused defoliation and death of the plants at 24° and 28° C., about 20 days after infection. Symptoms of all strains were masked at 35° C. for a 20-day period. Characteristic symptoms developed in 6 days upon removal to 24° C.

The degree of phloem necrosis of stems of infected Physalis floridana was very closely correlated with morphological symptoms.

Each of the virus strains was found to protect against reinfection by another strain in Physalis floridana and in potato seedling 41956 (immune from virus X).

Root transmission was demonstrated by using P. floridana plants.

Reaction within a given potato variety was consistent to any given virus strain; however, varietal reaction to the 4 strains varied widely.

To secure 100 percent infection on Physalis floridana, aphids were shown to require a 6-hour feeding period on the source of inoculum to acquire the virus, and after an interval or latent period of 30 hours were capable of transmitting the virus. Once the aphids became viruliferous only a 2-hour feeding period was required for full infection.

With the evidence to date, the potato leaf-roll virus can no longer be considered a single, uniform entity, but exists as a number of strains, which differ widely in their response to temperature and in the type and severity of symptoms they produce.

(Wis. Agr. Expt. Sta. Res. Bul. 178: 1-32, September, 1952)

Breeding for Scab Resistance

Crossing work involving scab-resistant parents from Wisconsin, Minnesota, U.S.D.A., North Dakota, and Iowa was continued in the greenhouses at Madison during 1952. In greenhouses and cold frames 7,500 new seedlings were produced. 10,000 first-tuber generation seedlings, including 2,600 from C. E. Peterson of Iowa, and 3,500 advanced generation seedlings, were grown at the Potato Research Farm at Rhinelander for selection and seed increase purposes. 2,600 selections were tested at Antigo for scab resistance. Of these some 15% possessing scab resistance, early maturity, and good tuber type were saved. One outstanding early scab-resistant selection, D 27.50, has been increased for advanced-generation commercial testing.

North-Central Regional Potato Trials - 1952

Nineteen advanced generation selections and newly named varieties from Michigan, Minnesota, North Dakota, Iowa, Nebraska, and Wisconsin were grown in a cooperative trial at the Powell Farm, Antigo, Wis. Standard procedures in regard to experimental design and methods of evaluation agreed upon by members of the North-Central Committee (C. E. Peterson, chairman) were followed. The results are presented in Wisconsin table 1. Cherokee and Minnesota selection Min. 113.43-8-45 produced exceptionally high yields. The performance of the following four selections with red skin color superior to Triumph was one of the outstanding features of the trial: ND 45.11-101, Neb. 20.42-9, Ia. X26-8 and Wis. 1301. Most of the selections and three standard check varieties exhibited high specific gravity determinations in the 1952 trial and exceptionally low specific gravity ratings in the 1951 trial. The two trials were made on the Powell Farms under similar cultural practices and soil type. No variety or selection could be classified as suitable for baking in the 1951 trial, whereas three-fourths of the varieties and selections could be designated as bakers in the 1952 trial. These results, like many others, indicate that varietal cooking quality evaluations based on specific gravity must be correlated with growing conditions.

Clonal Variation in Chippewa

A wide range of plant characters has been observed in the Chippewa potato variety grown in commercial fields and tuber-unit seed plots in northern Wisconsin during the past decade. An attempt has been made to determine variants due to (1) environmental effects, (2) disease effects, especially responses to virus diseases, and (3) genetic origin.

Disease Effects

A strain of Chippewa, free from virus X, has been maintained in the greenhouse. Seed stocks of the greenhouse-grown X-virus-free (XF) strain have been increased each year in an isolated field plot for testing purposes. The results presented in Wis. table 2 indicate that the XF strain, which was not selected for high-

Wis. table 1. Yield, percentage of U.S. No. 1 tubers, specific gravity, and scab resistance of advanced-generation selections from North-Central States in comparison with three standard varieties on Powell Farms, Antigo, Wis. 1952.*

Variety	Matur- ity	Yield per acre Total U.S. #1	Specific gravity	Scab reading	Remarks
		Bu.	Pct.		
Cherokee	M	524	95	1.095	3-2 Large rough tubers, bright tough skin.
Min. 113.43-8-45	E	510	95	1.077	- Oblong good sample
Irish Cobbler	EE	491	96	1.084	4-3 Large rough tubers
Katahdin	L	491	97	1.088	3-3 Uniform, smooth, attractive
N.D. 515-2	EE	486	97	1.079	1-2 Burbank type russet, smooth oblong shape, growth cracks.
N.D. 45.11-101	M	476	95	1.086	3-2 Med. red color, fair shape, vigorous upright vines.
Wis. K5	M	474	94	1.078	3-3 Smooth oval shape.
Neb. 20.42-9	E	469	96	1.081	2-3 Good red, some growth cracks.
Wis. 303-40	L	464	94	1.089	2-2 Immature, large size.
Wis. M 804	L	450	93	1.099	1-1 Smooth, oval, light russet.
Mich. 1363	EE	445	96	1.075	1-2 Smooth oval, skin well set, no growth cracks.
Mich. 46-9	L	421	94	1.089	2-2 Immature, large size rough.
Mich. B 505-3	L	404	94	1.075	1-1 Average sample, smooth oval
Min. 15.46-20-48	M	396	95	1.091	- Holds shape like Kat. at large size, low tuber set, no growth cracks.
Ia. X26-8	M	394	86	1.090	1-1 Good red, smooth oval, size small to medium.
Wis. 1301	E	389	94	1.080	2-3 Attractive deep red, smooth oblong.
N.D. 457	EE	384	95	1.089	3-2 Uniform oval tubers of good type, few growth cracks.
Triumph	E	382	93	1.084	4-3 Light red color, uniform size.
Neb. 20.44-2	E	375	92	1.075	2-4 Attractive deep red color, skin well set, smooth to med. size, uniform.
Neb. 89.46-2	L	302	96	1.085	2-3 Good red, smooth oblong shape.
Ia. 6316	M	268	95	1.090	3-2 Long, large, low set, growth cracks.
Neb. 59.41-P	E	189	78	-	1-1 Poor sample, tuber rots.

* Size of replicates: 25 hills - single rows 3' x 25'

Plot design: 22 varieties randomized in each of 4 blocks.

yielding ability, produced yields equal to the X-virus-infected Starks strains RC, 20, and WB, which were selected for their high-yielding ability. The two Starks strains 5 and 9, which were selected for their early maturity and the Blondy strain selected for its yellow-green character, produced about 100 bushels per acre less than the XF strain and Stark's highest-yielding strains RC, 20, and WB. These results suggest that differences in the yielding ability of clonally selected Chippewa strains may be influenced by both disease effects and genetic variations.

Wis. table 2. Yield trial of Chippewa strains*.

Chippewa strains	Yield						Yield per acre
	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Rep. 5	Rep. 6	Total
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Starks RC	130	122.5	143.5	117	151	129.5	793.5
XF	118.5	124.5	118	111.5	151	159.5	783
Starks 20	129.5	119	135	112	151.5	130.5	777.5
Starks WB	156	104.5	135.5	133	136	110	775
Starks 5	120	85	117.5	93.5	114	122.5	652.5
Starks 9	133.5	80	84	99.5	127	103.5	627.5
Blondy	107.5	92.5	113.5	89	108	101.	611.5

* Location: University Potato Research Farm, Rhinelander
 Size of replicates: 30 hills - single rows 3' x 30'
 Plot design - 7 strains randomized in each of 6 blocks.

Genetic variability

Abrupt changes in plant characters have been observed from year to year in a number of clonal lines of Chippewa. Some of the changes in plant characters appear to be permanent while others frequently show reverse mutations similar to the original form. A new clonal mutation called Blondy, because of its light yellow-green stems and leaves, has exhibited considerable variability. Areas of normal-green color for the Chippewa variety frequently occur in varying amounts on the leaves and stems, resulting in a pattern resembling mosaic infection.

Forty-eight hill-selections of the Blondy strain were planted in 10-hill units on the Potato Research Farm at Rhinelander during the spring of 1952. Twenty-two selections of average Blondy hills produced varieties similar to those observed in 1951. Twenty-three selections of hills that had exhibited both normal-green and Blondy yellow-green stems produced increased amounts of normal-green foliage. These selections of hills that had shown only normal-green foliage (like Chippewa) produced two kinds of populations --(a) one hill-selection continued to show all normal-green foliage; (b) two hill-selections segregated for both normal-green and yellow-green.

The Blondy variation appears to exert a depressing effect on yield (Wis. table 2). Fortunately, the yellow-green foliage characters of the Blondy strain is easily recognized and its relation to yield can readily be studied. In most cases clonal variations having to do with yielding ability are not easily recognized, since laborious yield trials are necessary to demonstrate their

existence with certainty. The Blondy strain of Chippewa affords a new approach to a study of the effect of a somatic mutation on yield.

Wis. table 3. Uniform scab nurseries, Antigo, Wisconsin, 1952.

Variety	Color	Replication 1 <u>1</u> /				Replication 2 <u>1</u> /			
		Seedling		Check <u>2</u> /		Seedling		Check	
		Ar	Ty	Ar	Ty	Ar	Ty	Ar	Ty
B 73-10	W	T	1	1	4	T	2	3	4
B 402-1	W	1	2	1	4	T	1	3	3
B 515-2	Rus	1	1	2	3	1	2	3	4
B 595-76	W	1	2	2	4	2	2	3	4
B 2067-1	R	1	4	3	4	2	3	3	4
B 2131-3	R	1	3	3	4	3	3	3	4
B 2162-18	R	1	2	4	4	T	2	3	4
B 2162-36	R	1	1	4	4	2	2	4	3
B 2162-49	R	2	2	3	4	2	2	3	4
B 2331-1	R	3	3	3	4	2	3	3	4
B 2340-2	R	3	4	3	4	2	3	3	3
B 2368-6	R	3	4	3	4	3	3	3	4
B 2368-13	R	2	4	3	4	3	3	3	4
B 2369-4	R	2	3	2	4	3	3	4	4
B 2861-1	R	3	2	3	4	2	3	4	3
B 2874-4	R	1	3	3	4	1	3	3	4
B 2879-5	R	1	1	3	4	1	2	3	3
B 2888-2	W	2	3	4	4	1	2	3	3
B 2893-11	W	3	4	3	4	3	3	3	4
B 2900-54	W	3	3	3	4	3	3	3	4
B 2914-1	W	4	4	4	4	4	4	1	4
B 2920-13	W	2	2	4	4	3	4	3	4
B 2920-20	W	1	2	4	4	T	1	2	4
B 2921-4	W	3	3	3	4	2	2	3	3
B 2921-10	W	4	3	3	4	2	2	3	4
B 2922-15	W	4	4	4	4	1	2	2	4
B 2922-26	W	3	4	3	4	1	3	1	4
B 2922-29	W	2	3	3	4	1	1	1	1
B 2924-2	W	2	2	3	4	T	2	2	3
B 2968-56	W	3	3	3	4	2	3	1	3
B 2968-66	W	3	4	3	4	1	3	2	4
B 2969-12	W	2	3	3	4	1	1	1	4
B 3004-9	W	2	4	3	4	T	2	T	2
B 3008-10	W	4	4	4	4	1	3	3	4
B 3009-7	W	3	3	3	4	2	2	3	4
B 3009-9	W	2	2	4	4	T	2	4	3
B 3014-6	W	3	4	4	4	1	3	3	3
B 3014-15	W	3	3	5	4	2	3	3	4
B 3015-23	W	3	4	3	4	1	2	4	4
Neb. 59.41 P1	R	4	3	3	4	T	1	3	4
ND B 2336 NI	W	4	3	4	4	1	4	3	4
N.D 457-1	W	4	3	4	4	T	1	2	3

Variety	Color	Replication 1 <u>1/</u>				Replication 2 <u>1/</u>			
		Seedling		Check <u>2/</u>		Seedling		Check	
		Ar	Ty	Ar	Ty	Ar	Ty	Ar	Ty
Cayuga	W	2	2	3	4	T	1	1	2
Seneca	W	2	3	4	4	1	1	1	2
Ontario	W	1	2	3	4	1	1	2	4
Progress	R	4	4	4	4	1	1	1	3
Menominee	W	3	2	3	4	T	1	T	1
Cherokee	W	3	3	3	4	1	3	3	4
Russet Burbank	Rus	3	3	4	3	1	2	2	4
M304		3	3	3	4	T	1	3	4
M804		1	2	3	4	1	1	2	4
303-40		3	2	3	4	3	3	3	4
M439		1	2	4	4	2	3	2	4
303-4		2	2	2	4	1	2	3	4
M330		T	1	3	4	2	2	2	4
Sebago	W	3	2	3	4	3	3	3	4
R. Sebago	Rus	2	2	3	4	2	3	3	3
Hindenburg <u>3/</u>	Rus	2	2			1	2		
"		2	2			1	2		
"		T	1			T	2		
"		2	2			T	1		
"		2	2			1	2		
"		1	2			2	2		
Rus. Burbank <u>3/</u>		2	4			3	3		
"		2	3			1	3		
"		2	3			1	2		
"		3	4			1	2		
"		3	3			2	2		
"		2	3			2	3		

1/ See footnote in Plant Industry table 11.

2/ Check = Chippewa.

3/ Scab resistant checks planted every tenth sample.

WYOMING

Wm. A. Riedl, Clarence M. Rincker and G. W. Arnold

The work at Wyoming consisted of testing varieties and promising seedlings for yield, specific gravity, and resistance to ring rot and scab. In our potato-breeding work, emphasis has been placed on the development and selection of red-skin varieties resistant to scab and ring rot.

Variety Yield Trials

Eighteen varieties and 40 promising seedlings were grown in 4 yield trials at Laramie. These were planted in 40-foot rows replicated 4 times. The results of 3 of these trials are given in Wyoming tables 1, 2, and 3. In a preliminary yield trial, 144 promising new seedlings and 8 Bliss Triumph checks were grown in 30-hill rows without replications. Variety yield trials were also conducted at 5 substations.

Seedling Observation

Approximately 200 seedlings were grown in 4-hill rows for observation.

First-Year Seedlings

Approximately 75 seedling lines were grown at Laramie. Approximately 150 selections were made from these lines.

Seedling Increase

Thirty promising seedlings were increased at Laramie. Ten seedlings were increased at the Torrington Substation.

Ring-rot Studies

One hundred new seedlings were tested for resistance to ring rot. None were found to be highly resistant.

Eight ring-rot-resistant seedlings were again tested for resistance to ring rot. Five out of the eight show no ring-rot symptoms in 40-hill rows, while 3 showed one questionable ring-rot plant out of 40-hills. The Bliss Triumph check had 98 percent of the plants showing ring-rot symptoms.

Wyoming table 1. Potato variety trials, Laramie, Wyoming

Variety	Yield per acre	U.S. No. 1 per acre	U.S. No. 1	Starch <u>1/</u> content
	Bu.	Bu.	Pct.	Pct.
Pontiac	581	469	81	11.0
White Rose	580	440	76	10.5
Kennebec	563	442	78	12.7
Red Pontiac	552	455	82	11.0
Yampa	495	416	84	13.5
DeSoto	479	430	90	12.9
Russet Burbank	470	365	78	13.1
Bliss Triumph	453	343	76	12.9
Red McClure	438	322	73	13.3
Irish Cobbler	426	379	90	13.9
Katahdin	404	355	88	12.7
Russet Rural	397	308	77	14.4
Satapa	387	284	73	13.3
Progress	387	283	73	12.2
Kasota	378	302	80	12.9
Red Warba	375	219	85	13.3
Teton	373	297	80	12.4
White Cloud	326	308	94	14.6
L.S.D. at 5% level	40.1	48.8		

1/ The percentage of starch was based on the specific gravity of the tubers.

Wyoming table 2. Potato seed^{ling}/yield trial No. 2, Laramie, Wyoming

Variety	Yield per acre	U.S. No. 1 per acre	U.S. No. 1	Starch <u>1/</u> content
	Bu.	Bu.	Pct.	Pct.
2483	605	532	88	12.4
2480	587	529	90	12.2
2556	548	506	92	13.1
2479	547	498	91	11.0
2474	505	449	89	13.3
2548	488	423	87	12.4
2488	485	436	90	12.4
2477	481	416	87	13.9
2485	476	392	82	14.4
2476	459	406	88	11.0
2481	459	382	83	13.7
2551	452	423	93	14.4
B.T.	433	343	79	12.9
2484	408	385	94	15.0
2558	399	370	93	15.0
2482	394	365	93	13.9
2486	390	315	81	12.2
2541	366	322	88	13.7
L.S.D. at 5% level	59.7	53.0		

1/ The percentage of starch was based on the specific gravity of the tubers.

Wyoming table 3. Potato seedling yield trial Laramie, Wyoming.

Variety	Yield per acre	U.S. No. 1 per acre	U.S. No. 1	Starch ^{1/} content
	Bu.	Bu.	Pct.	Pct.
2379	572	535	93	11.0
2372	568	502	88	*
2358	536	436	81	*
2375	515	391	76	*
2533	514	437	85	14.6
2369	508	448	88	*
2559	490	442	90	14.8
2550	478	447	93	15.0
2361	471	397	84	*
2371	462	328	71	*
2544	445	392	88	*
2388	430	250	58	*
2552	406	346	85	*
Bliss Triumph	403	284	70	12.9
2534	374	331	88	*
2560	356	324	91	12.2
2374	313	283	90	*
2553	313	245	78	*
L.S.D. 5% level	65.7	61.4		

^{1/} The percentage of starch was based on the specific gravity of the tubers.

* Seedlings discarded from trial, hence specific gravity test not conducted.

Wyoming table 4. Uniform scab nursery, Wyoming, 1952. (By ~~H~~. Walters)

Variety	Color	Replication 1 ¹ / ₁				Replication 2 ¹ / ₁			
		Seedling		Check ² / ₂		Seedling		Check	
		Ar	Ty	Ar	Ty	Ar	Ty	Ar	Ty
B 73-10	W	1	2	3	3				
B 402-1	W	T	1	2	3	1	1	2	3
B 515-2	Rus	T	1	3	3	T	1	1	3
B 595-76	W	T	3	2	3	1	3	3	3
B 904-6	W	1	2	3	3	1	3	2	3
B 2067-1	R	1	2	3	3	1	2	2	3
B 2131-3	R	1	3	3	3	1	3	2	3
B 2162-18	R	T	2	2	3	1	3	2	3
B 2162-36	R	T	1	3	3	T	1	3	3
B 2162-49	R	T	1	3	3	T	1	2	3
B 2173-22	W	1	2	2	3	T	1	3	3
B 2331-1	R	T	2	3	3	1	3	2	3
B 2340-2	R	2	3	2	3	2	3	3	3
B 2368-6	R	1	2	3	3	1	3	2	3
B 2368-13	R	1	3	2	3	1	3	2	3
B 2369-4	R	T	2	2	3	T	2	2	3
B 2861-1	R	1	2	2	3	1	3	3	3
B 2874-3	R	1	2	2	3	1	3	3	3
B 2874-4	R	1	3	2	3	1	3	3	3
B 2879-4	R	T	1	1	3	1	3	3	3
B 2879-5	R	1	2	2	3	T	1	2	3
B 2879-7	R	T	1	3	3	T	1	2	3
B 2887-2	W	1	3	3	3	T	2	2	3
B 2888-2	W	T	2	3	3	1	3	2	3
B 2892-3	W	T	1	3	3	2	3	3	3
B 2892-11	W	1	2	2	3	T	2	1	3
B 2900-24	W	1	2	2	3	1	3	2	3
B 2900-42	W	1	2	2	3	T	1	3	3
B 2900-54	W	T	3	3	3	1	3	3	3
B 2914-1	W	2	4	2	3	1	2	2	3
B 2920-13	W	T	1	3	3	1	3	2	3
B 2920-20	W	T	2	2	3	1	3	2	3
B 2921-4	W	T	1	2	3	1	2	2	3
B 2921-10	W	1	2	3	3	1	3	3	3
B 2922-15	W	1	3	2	3	T	3		
B 2922-26	W	2	2	2	3	1	3	2	3
B 2922-29	W	1	2	2	3	1	3	2	3
B 2924-2	W	2	3	3	3	2	3	2	3
B 2935-7	W	T	2	2	3	T	2	3	3
B 2968-56	W	1	3	2	3	1	3	3	3
B 2968-66	W	1	3	2	3	2	3	3	3
B 2969-12	W	1	3	2	3	1	3	2	3
B 3003-27	W	2	4	3	3	2	4	3	4
B 3003-26	W	1	3	2	3	1	3	2	3
B 3004-9	W	2	3	2	3	1	3	3	3

Wyoming table 4 continued

Variety	Color	Replication 1 <u>1/</u>				Replication 2 <u>1/</u>			
		Seedling		Check <u>2/</u>		Seedling		Check	
		Ar	Ty	Ar	Ty	Ar	Ty	Ar	Ty
B 3008-10	W	1	3	2	3	1	3	2	3
B 3009-7	W	T	1	2	3	1	3	3	3
B 3009-9	W	T	1	2	3	1	1	3	3
B 3014-6	W	1	3	3	3	T	3	1	3
B 3014-15	W	1	3	2	3	1	3	3	3
B 3015-23	W	T	3	2	3	2	3	2	3
Neb. 59.41 PI	R	1	3	3	3	T	2	1	3
N.D. B2336 NI	W	2	4	2	4	2	3	3	3
N.D. 457-1	W	2	3	3	3	1	3	2	3
M 304		T	3	2	3				
M 330		1	2	2	3	1	3	3	3
M 439		T	1	2	3	T	1	2	3
M 804		T	1	2	3	1	3	3	3
303.41-4		1	2	2	3	T	2	2	3
303.41-40		1	3	2	3	T	4	2	3
Cayuga	W	T	2	2	3	T	1	2	3
Cherokee	W	T	2	1	3	1	3	3	3
Menominee	W	T	2	3	3	T	2	2	3
Ontario	W	T	1	2	3				
Progress	R	2	3	3	3	2	3	2	3
R. Burbank	Rus	T	1	1	3	1	2	3	3
R. Sebago	Rus	1	3	2	3	1	3	2	3
Sebago	W	1	3	1	3	1	2	3	3
Seneca	W	1	3	3	3	T	3	2	3

1/ See footnote in Plant Industry table 11.

2/ Check = Bliss Triumph.

